ZIONSOLUTIONS LLC
An Energy Solutions Company

10 CFR 50.54(a)(3)

ZS-2010-0199

July 27, 2010

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Zion Nuclear Power Station, Units 1 and 2
Facility Operating License Nos. DPR-39 and DPR-48
NRC Docket Nos. 50-295 and 50-304

Subject: Zion*Solutions* LLC Quality Assurance Project Plan, ZS-QA-10

References:
1) Letter from T. S. O'Neill (Exelon Generation Company) and J. Christian (Zion*Solutions*) to NRC, "Application for License Transfers and Conforming Administrative License Amendments," dated January 25, 2008

2) Letter from P.B Cowan, Exelon Generation Company, LLC and AmerGen Energy Company, LLC, "Submittal of Exelon Generation Company, LLC and AmerGen Energy Company, LLC Quality Assurance Topical Report, NO-AA-10, Revision 84," dated February 5, 2010

In accordance with the requirements of 10 CFR 50.54(a)(3), Zion*Solutions*, LLC (Zion*Solutions*) is submitting the Zion*Solutions* Quality Assurance Project Plan (QAPP) for NRC review. This letter satisfies the requirements of 10 CFR 50.54(a)(3) to provide the NRC with information on changes to the quality assurance program which do not reduce commitments in the program description, and therefore, do not require NRC approval prior to implementation.

By order dated May 4, 2009 the NRC has approved the transfer of Facility Operating License Nos. DPR-39 and DPR-48 for Zion Nuclear Power Station Units 1 and 2 (Zion) from Exelon to Zion*Solutions*. As indicated in the application for this license transfer (Reference 1), Zion*Solutions* will implement the applicable requirements of the NRC approved Exelon Quality Assurance Topical Report (QATR, Reference 2). The QATR, Appendix A, Section 2.6.1 "Augmented Quality Requirements for Zion Station's Important to Defueled Condition Structures, Systems, Components and Activities" includes provisions for an augmented quality assurance program specific to the defueled condition.

Based on recent improvement in the value of the Zion decommissioning trust fund, Zion*Solutions* expects the transfer of the Zion operating licenses to occur soon and intends

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to begin decommissioning activities promptly thereafter. To assure appropriate control of activities associated with dry fuel storage, Zion*Solutions* has prepared a major upgrade to the quality program document that incorporates the prior provisions of the QATR applicable to Zion Station and also addresses the full requirements of 10 CFR 50, Appendix B. The upgraded program is now referred to as Zion*Solutions* document ZS-QA-10, Zion Station Quality Assurance Project Plan (QAPP) (Enclosure 1). Enclosure 2 provides a discussion of the QAPP commitments to NQA-1-1993 and describes the additional supporting information which is provided in Enclosures 3 and 4. While this change supplements the currently applicable requirements, it results in no reduction in prior commitments and is therefore submitted in accordance with the requirements of 10 CFR 50.54(a)(3).

Zion*Solutions* expects to implement the QAPP concurrent with completion of the transfer of the operating licenses.

If you have any questions about this letter, please contact me at (847) 789-4042.

Respectfully,

T. R. Tramm

Tom R. Tramm
Director, Regulatory Affairs & QA
Zion*Solutions*, LLC

Enclosures:
(1) ZionSolutions Quality Assurance Project Plan, Rev 1, dated February 9, 2010
(2) Summary of Commitments to NQA-1
(3) NQA-1 to QAPP Cross-reference Matrix
(4) NQA-1 vs. Non-programmatic ANSI Standards Tables (6)

cc: Regional Administrator, Region III, US NRC

Enclosure 1

ZIONSOLUTIONS LLC
An EnergySolutions Company

Quality Assurance Project Plan

ZS-QA-10

ZionSolutions LLC

Zion Station Restoration Project

Revision 1

February 9, 2010

Author Approval:	Edward L. Martin, Acting Quality Assurance Manager	11 FEB 2010 Date
RA/QA Approval:	Tom R. Tramm, Director, Regulatory Affairs and QA	2/18/10 Date
Corporate QA Approval:	Richard E. Campbell, EnergySolutions Corporate Director, QA	2/17/10 Date
Senior VP Approval:	Patrick Daly, Senior VP & General Manager	2/18/2010 Date

ZION*SOLUTIONS* LLC
ZION STATION RESTORATION PROJECT

STATEMENT OF QUALITY ASSURANCE POLICY

This Quality Assurance Project Plan (QAPP) defines the Zion*Solutions* LLC Quality Assurance Program to be implemented during the Zion Station Restoration and Dry Cask Storage (DCS) Project at the Zion Nuclear Power Station (ZNPS) site. This QAPP is designed to meet the requirements of Title 10 of the Code of Federal Regulations, Part 50 Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," ANSI/ASME NQA-1-1994, Part 71, Subpart H, "Quality Assurance Requirements for Packaging and Transportation of Radioactive Waste" and Part 72, Subpart G, "Quality Assurance Requirements for the Independent Storage of Spent Nuclear Fuel, High Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste."

The QAPP incorporates the applicable portions of the current Energy*Solutions* Quality Assurance Program (QAP) Revision 0, effective date May 31, 2007, and the existing Exelon Quality Assurance Topical Report (QATR) Revision 81, Appendix A, Section 2.6, Augmented Quality requirements for Zion Station. Augmented Quality requirements are addressed in the appropriate subsections of Section 4.0, Quality Assurance Requirements, and are implemented in a graded approach.

Implementation of the QAPP will include initial training to ensure employees are aware of their personal responsibility to consistently deliver quality products and services that meet regulatory, and industry requirements while ensuring the health and safety of their fellow workers, the public, and the environment.

This QAPP applies to all activities associated with the design, fabrication, installation, and operation of an Independent Spent Fuel Storage Installation (ISFSI), safe storage of spent nuclear fuel, and all related plant modifications and other site activities as designated by the General Manager. Design and fabrication of the Dry Fuel Storage System (DFSS) portion of the DCS project will not be performed under this QAPP; however, selection, qualification, and performance-based overview of the selected DFSS designer and DFSS fabrication will be conducted in accordance with this QAPP.

02/11/2010
President, Zion*Solutions* LLC

Chief Executive Officer, Zion*Solutions* LLC

TABLE OF CONTENTS

TABLE OF CONTENTS

FIGURES

APPENDICES

1.0 Introduction

The Zion Nuclear Power Station (ZNPS) located in Zion, Illinois is currently being maintained in a SAFSTOR condition by its owner, Exelon Corporation. The Exelon Quality Assurance Topical Report (QATR) is designed to meet the requirements of 10 CFR 50, Appendix B, and ANSI/ASME NQA-1-1994, and reflects the direction of applicable regulatory guides and industry standards thereby assuring that the health and safety of the public is not caused undue risk.

Energy*Solutions* has entered into an agreement with Exelon under which Zion*Solutions,* a wholly-owned subsidiary of Energy*Solutions*, assumes ownership of the facility, takes possession of the licenses, and undertakes decommissioning activities, to be conducted by Energy*Solutions* and affiliated companies.

The nuclear fuel stored in the Spent Fuel Pool (SFP) will be placed in Dry Cask Storage (DCS) casks and stored in an ISFSI, a secured storage pad on the ZNPS site. In addition, greater than Class C (GTCC) waste also will be stored at the ISFSI location.

This Quality Assurance Project Plan (QAPP) defines the methodology that the Zion*Solutions* Project Team will utilize to meet the quality assurance requirements of 10 CFR 50 Appendix B, ANSI/ASME NQA-1-1994, 10 CFR 71 Subpart H, and 10 CFR 72 Subpart G as applicable to these tasks.

1.1 Project Quality Assurance Program

This QAPP defines the Quality Assurance (QA) program requirements applicable to the Zion*Solutions* restoration and DCS project including activities such as: existing plant operations, licensing, site design, procurement, vendor selection, fabrication, shipping, receiving, storing, cleaning, erecting, site installation, inspecting, testing, cask loading, cask sealing, cask handling, preparation for an ISFSI operation, waste handling, packaging and transportation, and associated plant modification activities. The QAPP also may be utilized for other site activities as designated by the General Manager. Quality Assurance, as defined herein, encompasses all those planned and systematic actions related to the control of the physical characteristics and quality of the material or components to predetermined requirements necessary to provide adequate confidence that a component, structure, or system will perform satisfactorily in service. Quality is recognized as an interdisciplinary function and not the sole responsibility of the Quality Assurance Department. The QAPP utilizes the existing 10 CFR 50 Appendix B, NRC approved, Exelon QATR as the initial basis of the program. In addition, the QAPP incorporates the Energy*Solutions* NRC approved 10 CFR 71 Subpart H QAP requirements.

QA programmatic requirements within this QAPP are based on, and meet, all applicable quality assurance requirements stipulated in 10 CFR 50 Appendix B, 10 CFR 71 Subpart H, and 10 CFR 72 Subpart G. In addition, the applicable requirements of

ANSI/ASME NQA-1-1994 Basic Requirements have been incorporated. It should be noted that the Energy*Solutions* QAP commits to the requirements of 10 CFR 50 Appendix B, 10CFR71 Subpart H, 10CFR72 Subpart G, and ANSI/ASME NQA-1.

The project's quality program as defined in this QAPP primarily consists of the current Exelon QATR, Energy*Solutions* QAP, and applicable existing ZNPS and Zion*Solutions'* implementing procedures and instructions. Additionally, project unique procedures and processes, and Subcontractor QA programs define various aspects of the quality program controls that are applicable to the DCS project and other site activities as designated by the General Manager, and supplement this QAPP. The project unique procedures and process documents address applicable elements of ASME NQA-1-1994 Supplementary Requirements.

Supplier and subcontractor quality activities associated with the DCS will be performed in accordance with a QA program that meets the requirements of this QAPP as specified in written Zion*Solutions* contract documents. Activities will not be subcontracted without documented permission of the Zion*Solutions* Senior Vice President & General Manager (GM) and Zion*Solutions* Quality Assurance Manager (QAM). Suppliers and subcontractors will perform their activities in accordance with their QA programs, procedures, and specific project procedures, which shall be reviewed and accepted by Zion*Solutions* QA prior to use. Subsequent to Zion*Solutions* acceptance, all major changes to supplier and subcontractor programs, procedures, instructions and processes applicable to the project shall be reviewed and accepted by Zion*Solutions* prior to use.

The Zion Restoration and DCS project includes activities that temporarily maintain existing SSCs in operation, decommissioning of SSCs that are no longer required, design and construction of an ISFSI and transferring fuel from the existing SFP to the ISFSI, and releasing the remainder of the site for unrestricted use. The QAPP is written to invoke the quality assurance requirements that apply to these activities based on their function and importance to safety. As such, varying degrees of QA criteria are applied.

1.2 Scope

This QAPP applies to project activities performed by the Zion*Solutions* project team and its suppliers and subcontractors for the duration of the DCS project activities associated with the operation and decommissioning of SSCs classified as Important to Defueled Condition (ITDC), and other site activities as designated by the GM. The DCS portion of the project is defined as beginning with the project conceptual design including ZNPS modifications required to accommodate the DFSS and continuing through the final placement of the last DFSS canister on the ISFSI pad and ending with the completion of the clean-out of the fuel pool. Operation of the ISFSI will be performed under this QAPP. The Restoration portion of the project includes activities that release the site for unrestricted use except for the ISFSI.

A Graded Approach To Quality shall be applied to the DCS project activities and other selected site activities as designated by the GM and will be defined through classification of tasks delineated in Section 3.0.

The Graded Approach to Quality involves both technical and quality oversight requirements for project activities, including subcontractors, and typically consists of a balanced review of technical and quality capabilities with a focus on technical acceptability of the activity, product and service.

The Augmented Quality requirements that were established by Exelon for existing SSC's designated as ITDC will continue to be applied in a graded approach as defined in the applicable subsections of Section 4.0, Quality Assurance Requirements.

See Section 3.0 for project task classification, Section 4.0 for QA requirements and Section 5.0 for QA oversight.

2.0 QUALITY RESPONSIBILITIES

This section defines the responsibilities of key project members accountable for implementation of the QAPP. Functions and actions can be delegated; however, the responsibility remains with the designated individual. Implementation and management oversight of the QAPP is the responsibility of the following key individuals:

Note: Minor variations may occur between the titles contained herein and those used in practice. Specific position descriptions may be contained in other approved company documents. Certain functions may be named differently within the Energy*Solutions* and Zion*Solutions* organizations.

2.1 Senior Vice President & General Manager (GM)

This project executive provides direct oversight of the project, and other selected tasks, to ensure the project is properly planned, staffed and executed. The General Manager has periodic meetings with the management team to review plans and progress and to address stakeholder, quality, and project management issues. The GM delegates to the Management Team the day-to-day responsibilities for the DCS project, plant operation and decommissioning such as, but not limited to, safe conduct of work, procedure reviews, test and experiment reviews, personnel qualification, and other selected tasks.

2.2 Senior Vice President & General Manager, Commercial Services Operations (SVP)

This executive manages the operation of all Energy*Solutions* projects at commercial facilities. He reports directly to the President of Zion*Solutions*. The SVP assures that the Zion*Solutions* project receives timely and effective support from Energy*Solutions* corporate groups. He meets periodically with the General Manager and other key managers to review plans and progress and to address project management and quality issues.

2.3 Management Team

The Management Team consist of those VP's, Directors and Managers who are the senior person in each department/functional area. They report directly to the GM on all DCS project, plant operations and decommissioning activities and are responsible for the implementation of the QAPP for the duration of the project and other site activities as designated by the General Manager. Management Team members have full authority and accountability for successful project planning and execution, including effective implementation of this QAPP. They are responsible for assuring that project personnel are properly indoctrinated, trained, and qualified to all applicable project quality and technical requirements. They also are responsible for satisfactory resolution of nonconforming conditions and effective implementation of corrective action commitments. They are responsible for contract management and

development of contract deliverables in accordance with quality requirements defined in this QAPP. They are also responsible for ensuring that applicable project quality and technical requirements are transmitted to, addressed by, and acceptably implemented by the project's Subcontractors.

2.4 Director Regulatory Affairs and Quality Assurance (DRA/QA)

The DRA/QA reports directly to the GM on licensing and quality assurance issues. The DRA/QA is responsible for the day-to-day licensing activities, interfaces with the Nuclear Regulatory Commission and Exelon, and is the Single Point of Contact for licensing and regulatory matters and concerns. The DRA/QA has management overview responsibility for quality assurance requirements and staffing. The Director is a member of the Zion*Solutions* Quality Council and, in the absence of the Quality Assurance Manager, chairs the Council.

2.5 Quality Assurance Manager (QAM)

The QAM reports to the DRA/QA, and has access to the GM and Energy*Solutions* Corporate Director, QA for quality matters. The QAM also has a functional relationship with the Management Team Members and Project Support Personnel (PSP). The QAM is responsible for establishing and maintaining the QAPP, monitoring the project's quality objectives through overview activities, and providing feedback to management on the effectiveness of the QAPP. The QAM evaluates, accepts, and performs oversight of supplier and subcontractor Quality Assurance programs.

The QAM formulates and assures execution of overview/acceptance plan for suppliers and subcontractors that lack acceptable Quality Assurance programs to ensure their full compliance with applicable requirements of this QAPP. The QAM is the custodian of this QAPP and, as such, is responsible for initiating necessary changes and revisions and obtaining necessary reviews and approvals of technical changes. The QAM and the Training Manager, with assistance from Quality Assurance personnel, provide orientation and training on applicable quality requirements to the project team. The QAM also is responsible for identification and execution of quality HOLD points, QC inspections, and QA/QC personnel qualification. The QAM chairs the Zion*Solutions* Quality Council and periodically provides reports on project quality activities to the GM, DRA/QA, and the management team.

2.6 Human Resources/Training/Labor Relations Manager (HRTLRM)

The HRTLRM reports directly to the GM in a number of capacities. For purposes of this QAPP, the Manager is responsible for overview and management of the project training program. The Manager shall periodically evaluate and report the status of the training program and effectiveness of the training process to the GM.

2.7 Zion*Solutions* Project Review and Advisory Board (PRAB)

The Project Review and Advisory Board provides independent oversight of the project to ensure compliance with licenses and regulations and to provide guidance on where improvements are needed and how they can be made. The PRAB has access to audit and management assessment reports and provides feedback to the GM and input to the Quality Council. The PRAB reports to the President, Zion*Solutions*.

2.8 Quality Assurance Personnel

The QA personnel report directly to the QAM and have a functional relation with management and support personnel. The QA personnel perform project overview activities such as oversight, auditing, and inspecting to verify that activities affecting the functions that are important to safety have been correctly performed. In addition, they support the supplier and subcontractor Quality Program evaluation process.

2.9 Support Personnel (SP)

The Project Team consists of a number of support personnel that are responsible for performing their activities in accordance with this QAPP. Support personnel activities include, but are not limited to, safety, ALARA/RP, engineering, licensing, operations, security, maintenance, document control/records, fire protection, reactor engineering, emergency planning, training, and procurement.

2.10 Supplier/Subcontractor Project Managers

Supplier/Subcontractor Project Managers are responsible for assuring their personnel are properly indoctrinated, trained, and qualified to all applicable project and Subcontractor quality program requirements. They are also responsible for assuring acceptable implementation of technical and quality requirements, and for ensuring when nonconforming conditions are identified, they are satisfactorily resolved.

2.11 Supplier/Subcontractor Quality Assurance Managers

The Managers are responsible for assuring their quality program and procedures are effectively implemented in accordance with the Supplier's QA program (reviewed and accepted by Zion*Solutions*) and this QAPP. Each Manager is responsible for providing proposed Quality Assurance program revisions to the QAM for review and acceptance prior to implementation on the DCS project. Each Quality Assurance Manager of major suppliers/subcontractors may be a member of the Quality Council as determined by the GM and QAM.

3.0 CLASSIFICATION OF PROJECT TASKS

The DCS project involves activities that include design, procurement, fabrication, construction, assembly, inspection, testing, repair, modification, and data collection that are subject to 10 CFR 50, 10 CFR 71, and/or 10 CFR 72 regulatory requirements. The Quality Assurance requirements of these activities are classified based on their function and importance to safety, and are described in Section 4.

The extent of the quality assurance criteria applicable to tasks associated with the Systems, Structures and Components (SSCs) will, as a minimum, be based on their quality classification. The level of quality rigor applicable to a task is directly proportional to the task's importance to safety. The quality classification dictates the quality requirements and overview applicable to a task.

Assignment of quality classification is a two-step process consisting of:

(i) Determination of EITHER important to safety OR not important to safety, and

(ii) Categorization of SSCs determined to be important to safety.

DCS SSCs are classified as Important to Safety or Not-Important to Safety based on their function and the definition of Important to Safety provided in Table 3.1, "DCS Quality Assurance Classification Category Descriptions." Guidance provided in NUREG-1536, NUREG-1567, and NUREG-1617 Standard Review Plans also is utilized when making the determination of task classifications.

Importance to Safety relates to the basic ISFSI nuclear safety criteria, as follows:

- Maintain subcriticality
- Maintain confinement
- Ensure that radiation dose rates and doses for workers and public do not exceed acceptable levels (and remain ALARA)
- Maintain retrievability of the fuel by normal means
- Heat removal (as necessary to meet the above criteria)

Once a SSC is determined to be Important To Safety it is further categorized into one of three quality assurance classification categories (A, B, or C) based on the descriptions given in Table 3.1. The ISFSI quality assurance classification categories given in Table 3.1 are consistent with the NRC guidance given in NUREG/CR-6407 and Regulatory Guide 7.10.

Table 3.1 – DCS Quality Classification Category Descriptions

Classification Category	Importance to Safety	Description
A	**CRITICAL** TO SAFE OPERATION	Any structure, system or component whose failure could directly result in a condition adversely affecting public health and safety. The failure of a single item could cause loss of primary containment leading to release of radioactive material, loss of shielding, or unsafe geometry compromising criticality control.
B	**MAJOR** IMPACT ON SAFETY	Any structure, system or component whose failure or malfunction could indirectly result in a condition adversely affecting public health and safety. The failure of a category B item, in conjunction with a failure of an additional item, could result in an unsafe condition.
C	**MINOR** IMPACT ON SAFETY	Any structure, system or component whose failure or malfunction would not significantly reduce the packaging effectiveness and would not be likely to create a situation adversely affecting public health and safety.
NITS	**Not Important To Safety**	Any structure, system or component whose failure or malfunction would not reduce the packaging effectiveness or would not create a situation adversely affecting public health or safety.

4.0 QUALITY ASSURANCE REQUIREMENTS

Quality procedures, instructions, processes, and systems will be utilized to manage, supervise and perform work for the duration of the Zion Restoration and DCS project. The approach to achieving effective quality assurance and control throughout the project involves the effective execution of this QAPP, the DFSS Designer, the Design Authority, and other supplier/subcontractor quality programs and associated procedures, instructions, processes, and systems. A Design Authority (DA) is a selected Architect-Engineering firm, crane designer, or the selected Dry Cask Storage System (DCSS) Designer for the DCS project. Each is the Design Authority within its assigned scope of responsibility.

4.1 Organization

The Zion Restoration and DCS Project organization, authority, duties, responsibilities, and interface requirements are addressed in QAPP Section 2.0, Quality Responsibilities. These activities include performing activities affecting the functions of structures, systems, and components which are important to safety, those associated with attaining quality objectives, and the QA functions. The primary Zion Restoration and DCS Project organizations are Zion*Solutions*, Energy*Solutions*, DFSS Designer, DFSS Prime Fabricator(s), and Design Authorities.

The QAM position shall be responsible for verifying the proper establishment and effective execution of the QAPP and shall have no assigned responsibilities that would preclude appropriate attention to Quality Assurance matters.

Quality Assurance staff shall have sufficient independence from cost and schedule considerations and shall have the access to work areas and organizational freedom to effectively identify quality problems, initiate, recommend or provide solution to quality problems through designated channels, verify implementation of solutions; and assure that further processing, delivery, installation, and use are controlled until proper disposition of a nonconformance, deficiency, or unsatisfactory condition has occurred. The QAM has the authority to stop work when significant conditions adverse to quality warrant such action.

In the case where differences of opinion involving the QAPP requirements exist, they shall be brought to the attention of the GM for resolution. If necessary, the QAM also has the ability to elevate the item to the Corporate Director, QA for resolution.

The responsibility for achieving and maintaining quality resides with those performing the work. Personnel or organizations not directly responsible for performance of the work can verify quality achievement of that work.

4.2 QA Program

The Zion*Solutions* Quality Assurance Project Plan (QAPP) consists of those planned and systematic actions necessary to assure that activities will be conducted in a satisfactory manner and that equipment and material will perform satisfactorily in service. The system is based on the concept that work performance is a process that can be planned, executed, assessed, and improved. Management is responsible for these ongoing activities. Since all work is accomplished using people, equipment, and procedures as directed by management, management is responsible for fostering an attitude of support and encouraging personnel to complete their work in a quality manner. All employees are responsible for identifying non-compliant work or areas for improvement. Management is responsible for identifying (both internal and external) project needs and expectations. Meeting these needs and expectations is a measure of quality and success.

4.2.1 QAPP Application

Procedures describe how Zion*Solutions* implements the requirements of the QAPP. These procedures document methods for planning, reviewing, implementing, controlling, and verifying activities affecting quality.

The QAPP shall apply to all activities that are important-to-safety or DCS operations and require compliance with applicable sections of the documents listed below:

- 10CFR50, Appendix B
- 10CFR71, Subpart H
- 10CFR72, Subpart G
- ANSI/ASME NQA-1-1994

The applicability of the QAPP takes into consideration the regulatory requirements for important-to-safety and DCS operations items and activities, as well as their complexity and impact on safety, the need for special controls, demonstration of compliance through inspection and test, and the degree of standardization of the item. The requirements of the QAPP are implemented using a graded approach allowing control over items and activities to be commensurate with their importance and level of risk and are not reductions in quality requirements. Measures are established for identifying the components, systems, and structures to be covered by the QAPP. During the planning of an activity or design of an item the QAPP requirements will be implemented through procedures.

4.2.2 Quality Achievement, Management, and Verification

The achievement of quality is the responsibility of all employees and is led by management. The QAPP provides for a systematic approach at various levels for oversight and assessment to assure the adequacy and effectiveness of implementation of the QAPP and implementing procedures. A tiered approach to verification and assessment includes self-checking by the individuals performing the work, supervision and oversight by management, independent inspection, and surveillance and verification to confirm adequacy and effectiveness of results. Managers are required to assess the effectiveness of their own operations and implementation of their portion of the QAPP. QA personnel perform independent audits, surveillances, and inspections to verify the effectiveness of the QAPP.

The management team provides systematic planning to establish the scope of work, analyze hazards, and confirm the appropriateness of methods to be used and controls to be applied. Work performed is then monitored to confirm performance within the established controls and to provide feedback to achieve continuous improvement as an integral process of assuring effectiveness of the quality and safety systems.

The management team members within each group periodically perform effectiveness reviews of activities that affect quality, safety, and regulatory requirements. The management team is comprised of representatives from Engineering, Operations, Quality Assurance, Safety, Radiation Safety, and other areas as needed.

On an annual basis, the Director, Regulatory Affairs and QA, will provide the GM an assessment on the effectiveness of the QAPP. This assessment is based on the performance and review of audits, independent assessments, inspections, surveillances, and trending.

4.2.3 Personnel Qualification and Certification

4.2.3.1 Training and Indoctrination

The requirements and responsibilities established for the project Team ensure that management assess their organizations' training needs and assure that all personnel performing activities affecting quality are indoctrinated, trained, and qualified according to their level of responsibility and assigned functions. This includes training on appropriate procedures, processes and policies and any special skill training required for the performance of job activities. Qualification is completed prior to

performing work, unless qualification is based upon demonstration of job skills under the supervision of a qualified person. The extent of such training is commensurate with the scope, nature, and complexity of the activity, as well as the education, experience, and abilities of the individual. Training scopes, objectives, and methods of implementation are included in approved procedures.

All activities affecting quality are accomplished under suitably controlled conditions. Controlled conditions include the use of appropriate equipment, suitable environmental conditions for accomplishing the activity, and assurance that prerequisites for the given activity have been satisfied. Management provides for any special control, processes, test equipment, tools, and skills to attain the required quality and for verification of quality.

Indoctrination and training are conducted as necessary to assure suitable proficiency is achieved and maintained. Project personnel shall be trained in the applicable procedures and project-specific documents..

The QAM shall monitor suppliers/subcontractors, as necessary, for implementation of these requirements.

4.2.3.2 Inspection and Test Personnel

Inspection and test personnel have experience commensurate with the scope of work and the complexity of the activity and are selected and trained in accordance with approved procedures. The job performance of inspection and test personnel is reevaluated at periodic intervals not to exceed three (3) years. Certification or qualifications that are revoked for deficient job performance will result in the reevaluation of items inspected or tested by the individual.

Personnel performing nondestructive examinations are qualified in accordance with the American Society of Nondestructive Testing recommended practice, or as otherwise commensurate with the NDE requirements.

Certification documentation shall be maintained in accordance with approved procedures.

4.2.3.3 Lead Auditors and Inspectors

Quality Assurance (QA) Lead Auditors are qualified and certified by Zion*Solutions* or by approved suppliers. Lead Auditors are qualified in accordance with established procedures, and records are maintained. Training methods, minimum experience requirements, and certification practices are in accordance with NQA-1, Supplement 2S-3, 1994. Proficiency evaluations are performed annually and documented for individuals performing audit activities and appropriate certification renewal or re-qualification actions are taken.

Personnel performing inspection activities are qualified and certified in accordance with established procedures that comply with ANSI N45.2.6, 1978 or NQA-1, Supplement 2S-1, 1994.

Auditor and Inspector certification documentation shall be maintained in accordance with approved procedures.

4.3 Design Control

Design Control procedures ensure that the design meets applicable regulatory requirements, and that design activities are carried out in a planned and controlled manner. Procedures describe responsibilities for design interface, control, verification, and change. Approved procedures govern translation of applicable project and regulatory requirements and design bases into design, procurement, and procedural documents, as well as controlling the design documents and design document distribution.

ITDC Design Control requirements are addressed via a graded approach.

Design controls shall be applied to: criticality physics, radiation shielding, stress, thermal, hydraulic, accident analysis, compatibility of materials, accessibility for in-service inspection, maintenance and repair, features to facilitate decontamination, and delineation of acceptance criteria for inspections and tests.

4.3.1 Design Input

The engineering organization is responsible for identifying and documenting design input. Design inputs include:

- Design basis;
- Performance requirements;
- Regulatory requirements;

- Equipment specifications;
- Industry codes and standards; and
- Technical requirements.

The input used in each design is documented, reviewed, and approved in a timely manner by the responsible design organization. Documented design inputs provide the necessary level of detail to ensure the design activity can be carried out correctly and provides a consistent basis for making decisions, accomplishing design verification, and for evaluating changes. Changes from approved design inputs, including the reason for the changes, are documented, approved, and controlled.

Design inputs including appropriate quality standards shall be specified in a timely basis and translated into applicable design documents. Deviations from the quality standards shall be controlled. Design measures shall include review for suitability of application for materials, parts, equipment and processes that are important to safety.

4.3.2 Design Process

Zion*Solutions* describes and controls the design process through approved procedures. Appropriate design documents are developed to support the design, construction/manufacture, and operation. Quality standards are identified, documented, and approved by cognizant personnel. In addition, measures are established for selection and review for suitability of application of materials, parts, equipment, and processes. Design activities result in design output documents that meet the design input requirements. Design documents contain the identification of assemblies and/or components that are part of the item being designed. These measures include provisions to assure quality standards are specified and included in design documents. Any deviations from these standards are documented, reviewed, and approved.

4.3.3 Design Analysis

Design analysis is performed and documented in accordance with approved procedures. Design analysis reports provide the following details as applicable:

- The objective of the analysis;
- Design inputs and their sources;
- Literature research and background data;

- Assumptions and designation of those that must be verified as design proceeds;
- Calculation methodology and calculations;
- Summary of results and compliance with requirements;
- Identification of computer calculations, including computer hardware and software; and
- Review and approval as specified in engineering procedures.

The Project team shall develop a standardized approach for the project to initiate, perform, document, check, approve, revise, and retain engineering calculations. This process will be utilized by project personnel performing design calculation activities including internal design review, validation, and verification activities on design information and design products produced.

4.3.4 Design Verification

Design verification is performed to ensure that appropriate requirements and project needs are translated to the design documents. Design verification is performed in accordance with approved procedures that define responsibilities, methods, and documentation requirements. Independent personnel who have qualifications equal to those of the original design personnel perform design verification. This could include an engineering supervisor who initiated the design provided he/she did not specify a singular design approach or rule out certain design considerations. No individual is ever the verifier for his/her own work or input.

Design verification methods include, but are not limited to, formal design reviews, alternative calculations, and qualification testing. The level of design verification applied complies with identified requirements.

Design verification is usually performed and discrepancy resolution is complete prior to the release of the design output document for production uses or process implementation. An exception would be cases where insufficient data exists to finalize the design at a point in the project where material procurement or preliminary facility construction must begin. In such cases, unverified portions of the design are identified and controlled. Final design verification is completed prior to reliance on the item or process to perform its function. Engineering Management shall document completion of design verification.

The design documents and records that provide evidence that a design analysis was accomplished in accordance with this QAPP shall be accumulated, maintained, and stored at the site for the duration of the project.

4.3.5 Design Review

Management is responsible for ensuring design reviews are performed at appropriate phases of the design process. Design review performance requirements, methods, and responsibilities are included in approved procedures.

The design is evaluated for the adequacy of the incorporated design inputs and the design methods used. Responsibilities for action items are assigned, verified completed, and the results are incorporated into the final design.

Individuals or multi-disciplined design review teams perform independent reviews on important-to-safety and DCS operations items. These reviews are performed by competent personnel and address the following as applicable:

- Design input selection;
- Design output compared to design input and verification requirements from interfacing organizations;
- Design methods;
- Design inputs correctly incorporated into the design;
- Adequately described, reasonable, and identified assumptions; and
- Assignment of quality levels.

QA may review design drawings, specifications, calculations, and procurement documents via a performance-based overview process (generally not as an in-line review responsibility).

4.3.6 Alternative Calculation

The requirements for verification by alternative calculations are described in procedures that include the review of appropriateness of assumptions, input data, and computer program or other calculation methods used.

4.3.7 Qualification Tests

Qualification testing (synonymous with design validation) provides the assurance that products conform to defined user needs and requirements. Qualification tests of important-to-safety and DCS operations items validate and demonstrate the adequacy of performance under conditions that simulate the most severe design conditions in accordance with written test procedures and test specifications. Test specifications are reviewed and approved by the responsible engineering organization. The engineering group responsible for the design approves results of the qualification tests. For tests performed on models or mockups, scaling laws are established and verified. Test results obtained for model or mockup test work are subject to error analysis, where applicable, prior to use in final design work. Information regarding verification that is incomplete, including incomplete qualification tests, is available prior to installation of equipment.

4.3.8 Design Changes

Changes to final design, field changes, and modifications are justified and subject to design control measures commensurate with those applied to the original design. These measures shall include assurance that the design analyses for the items are still valid. Where changes to previously verified designs have been made, the initial design verification shall be reviewed for the impact of the changes to the original design and the need for any supplementary design verification shall be determined. Changes are approved by the same, or equivalent, group organization responsible for review and approval of the original design documents.

4.3.9 Interface Control

Formal design interfaces are established when multiple organizations (internal or external) participate in the design process. Procedures are written that establish and document responsibility and authority for transmittal, review, approval, release, distribution, and revision of design inputs and design output documents. Transmittals shall indicate the status of design information or of documentation submitted, including any incomplete items that require further actions.

4.3.10 Computer Programs

Computer programs (whether generated, transferred, or purchased) used to calculate or develop important-to-safety and DCS operations data shall be subjected to documented verifications or validations, including evaluation of program changes. Computer programs may be used for

design analysis without individual verification of the program for each application provided:

- The computer program has been verified to show that it produces correct solutions for the encoded mathematical model within defined limits for each parameter employed; and
- The encoded mathematical model has been shown to produce a valid solution to the physical problem associated with the particular application.

4.4 Procurement Document Control

Controls for procured items and services are established in approved programs and procedures. These programs and procedures require the technical, quality, regulatory, and administrative requirements applicable to the procurement to be specified in procurement documents. To the extent necessary, procurement documents require suppliers to adequately implement a quality program consistent with the type and use of the item or service being purchased.

ITDC Procurement Document Control requirements are addressed via a graded approach.

Management is responsible for supplying personnel to perform the procurement process and ensuring that project-specific requirements for procurement documents are documented.

Procurement documents generated under the controls of this section involve project contracts placed with supplier/subcontractor team members or other supplier/subcontractors performing specific DCS tasks, and other tasks designated by the GM.

4.4.1 Content of the Procurement Document

Procurement documents shall include the following as applicable: the scope of work; technical and regulatory requirements; quality criteria for items and services; quality requirements for suppliers and sub-tier suppliers; documentation requirements; quality record maintenance and retention; right of access for audit or inspection; requirements for reporting and approving supplier generated nonconformance's; and identification of spare and replacement parts.

4.4.2 Procurement Document Review

Technical, safety, and quality personnel who have an understanding of the requirements and intent of the procurement, shall review the procurement documents. Procurement documents are reviewed, approved, and documented prior to award.

QA shall review all Important to Safety (ITS) procurements for the appropriate Quality Assurance requirements prior to issuance.

4.4.3 Procurement Document Changes

Changes to procurement documents receive the same level of review and approval as the original.

4.5 Instructions, Procedures and Drawings

Management is responsible for ensuring that important-to-safety and DCS operations activities are described in instructions, procedures, or drawings, which are prepared and approved prior to commencing activities. All project personnel are responsible to perform their activities in accordance with the requirements of these documents. These documents include appropriate quantitative and qualitative acceptance criteria to verify that the activity has been satisfactorily accomplished.

ITDC instructions, procedures and drawings requirements are addressed via a graded approach.

Management is responsible for maintaining these documents current to reflect actual work practice. Instructions, procedures, work instructions and drawings are prepared, reviewed, issued, and controlled in accordance with approved procedures.

Procedures shall be reviewed periodically for adequacy and effectiveness.

4.6 Document Control

Documents that prescribe or affect quality are controlled to ensure that the proper revisions are used. Controlled documents include documentation for important-to-safety and DCS operations activities such as procedures, work instructions, and drawings.

ITDC Document Control requirements are addressed via a graded approach.

The Document Control System ensures that all documents are properly identified, distributed, and retained as specified in approved procedures.

Documents are reviewed for adequacy and approved for release by authorized personnel prior to issuance. Documents are issued to and used at the location where the activity is performed as specified in project procedures. Document changes are reviewed and approved in accordance with project procedures. Project documents, including changes, shall be identified, prepared, reviewed, approved, maintained, revised, and controlled in accordance with the requirements of this QAPP.

Documents will be controlled based upon their revision date and specific project distribution lists. Management is responsible for assigning personnel to originate and process project documents, for review and approval, and assure that correct documents are being used.

4.6.1 Document Preparation, Review, Approval, and Issuance

Management is responsible for identifying documents to be controlled and for their distribution. Controls are established in approved procedures that define responsibility, authority, issue, use, and revision of controlled documents. Management ensures that documents are reviewed for adequacy, completeness, and correctness prior to issue.

4.6.2 Document Changes

Document changes are reviewed and approved in accordance with project procedures. Minor changes such as inconsequential editorial corrections do not require the same review cycle as the original document. Approved procedures define the types of changes considered minor and the persons who are permitted to make these changes.

4.7 Control of Purchased Materials, Equipment and Services

Zion*Solutions* procurement controls establish measures to ensure those procured items and services for important-to-safety and DCS operations applications are clearly and adequately specified in procurement documents. Items and services are provided by suppliers and subcontractors who are capable of producing items and furnishing services that conform to procurement document requirements. These procurement methods are controlled by procedures for supplier evaluation, review of procurement requirements, and audit/surveillance of supplier's facilities.

ITDC Control of Purchased Items and Services requirements are addressed via a graded approach.

Commercial grade items may be procured and dedicated for important-to-safety and DCS operations applications. Qualified project personnel shall identify the

critical characteristics and the method(s) (e.g., special tests and inspections, commercial supplier survey, source verification, and/or acceptable supplier/item performance record) to be used to dedicate commercial grade items. Dedication of commercial grade items shall be accomplished in accordance with approved procedures.

4.7.1 Supplier Evaluation

Project technical, procurement, and QA personnel participate, as appropriate, in evaluation of potential procurement sources performed by Energy*Solutions'* Corporate Quality Assurance Department or Zion*Solutions* QA staff. Zion*Solutions*' QA Department shall perform a third party review of Energy*Solutions*' audits to ensure they are acceptable to Zion*Solutions*'. Zion*Solutions*' recommendations of procurement sources are based on these evaluations. Results of supplier evaluations performed prior to contract award are documented and retained. The evaluations cover review of capabilities and facilities for technical, manufacturing, and quality performance, and include any or all of the following, as appropriate:

- Historical performance data, particularly in product quality and delivery.
- Review of supplier's QA Program, including current quality records.
- Inspections, audits, or surveillances to verify supplier's QA Program implementation.
- Source qualification programs.

Supplier evaluations include elements of the QA Program applicable to the purchased item or services.

Engineering and QA will identify supplier qualification requirements and documentation in accordance with procedures.

4.7.2 Procurement Requirements

Requirements to be met by the supplier are detailed in the procurement documents, which may include procurement specifications. Procurement specifications detail the supplier QA requirements such as inspection reports, provisions for inspection, equipment calibration prior to use, and provisions for inspection after component repair. The procurement specification also may require the supplier to submit the following for Zion*Solutions*'s review:

- Special process procedures for performing welding, heat treatment, and nondestructive examination.
- Recommended inspection point program.
- Appropriate documentation as required by applicable codes, standards, and procurement documents.
- Notices of nonconformance and their disposition.
- Test procedures in accordance with applicable codes and standards.

4.7.3 Supplier Surveillance

QA is responsible for conducting and documenting supplier surveillance activities. Surveillance activities may include:

- Witnessing tests, inspections, nondestructive examinations, and various special process operations.
- Monitoring heat treatment, welding, cleaning, preserving, and packaging activities.

QA also is responsible for verifying supplier conformance with established procedures such as:

- Use of Zion*Solutions* accepted drawings and procedures.
- Document change control.
- Material identification and traceability control.
- Control of repairs.
- Control and calibration of measuring and test equipment.

Documentation packages for purchased items, if required, are reviewed by QA or their qualified designee prior to release of the items for use. This documentation may include material test reports, inspection and test reports, NDE reports, and applicable code data reports.

4.7.4 Receiving Inspection

Receiving inspection shall be performed for purchased items that are important-to-safety or DCS operations related (including spare or replacement parts) to ensure that:

- Items are properly identified and correspond to the receiving documentation.
- Inspection records and certificates of conformance attesting to the acceptance of the items are available.
- Items accepted and released are identified as to their inspection status prior to forwarding them to a controlled storage area or releasing them for installation or further work.
- Physical attributes comply with specified requirements.

Records of such inspections and documentary evidence that material, equipment, and services conform to procurement specifications and documents shall be retained or be available prior to installation or use of the item, material, equipment or service, for the life of the package, and for the life of the ISFSI as applicable. Nonconforming conditions or discrepancies identified during a receipt inspection shall be documented on Condition Report (CR). ZS will keep all fuel records and ISFSI component records and turn them over to Exelon upon transfer of the 10CFR50 licenses.

4.7.5 Post Installation Testing

When used, post installation test requirements and acceptance criteria shall be established with input from the supplier, if appropriate.

4.7.6 Vendor Evaluation

A documented evaluation is required annually for suppliers maintained on the supplier list. Supplier audits, when required, shall be conducted at least once every thirty-six (36) months in accordance with the audit section of this document. A third party review of an audit performed or accepted by Energy*Solutions* may be performed to add the supplier to the list. This review shall be documented.

The controls used for procuring items or services include the requirement that the suppliers/subcontractors are required to implement their QA Program for the requested item or service for ITS category A and B. Applicable subcontractors are subject to technical and quality assurance reviews for acceptance. Suppliers/ subcontractors performing activities that affect quality will conduct the activities in accordance with a Quality Assurance program that meets the applicable requirements of this QAPP. Supplier/subcontractor QA programs must be reviewed and accepted by Zion*Solutions* QA prior to use including technical and quality assurance program changes that result from bid evaluations or negotiations. Subcontractors will be evaluated to pre-established technical and quality assurance requirements.

Supplier/subcontractor qualifications and capabilities will be determined based upon evaluation, previous quality services provided, surveillance/audit and/or Zion*Solutions* or Energy*Solutions* recommendations. In addition to an initial evaluation of the supplier/subcontractor QA program, QA will perform periodic independent oversight (audit, surveillance or assessment) at intervals consistent with the importance, complexity and quantity of the product or service to ensure performance as required by the applicable Zion*Solutions* procurement document.

4.8 Identification and Control of Materials, Parts and Components

Controls are established in approved procedures to assure that only correct and accepted items are used or installed. Identification is maintained either on the items or in documents traceable to the item. When such controls are required, the following methods of identification and control will be utilized.

4.8.1 Identification

Identification such as batch, lot, serial number, or part number is maintained from initial receipt up to and including installation. The identification relates the item to the applicable design or other specification document when appropriate. Zion*Solutions* utilizes physical identification when possible. Other means, including separation or procedural control, are used when physical identification is not possible.

4.8.2 Markings

Markings are applied using materials and methods that are clear, legible, and do not detrimentally affect the function or service life of the item. Markings are transferred to each part of an identified item when subdivided. Markings are not obliterated or hidden by surface treatments or coatings unless other identification methods are established.

4.8.3 Traceability

Project procedures specify methods for identification of items when codes, standards, or specifications require identification or traceability of an item. Procedures describe how to maintain traceability to a specification, grade of material, heat, batch, lot, part or serial number, or inspection, test, or other records.

The identification and control of material, parts, and components will include the use of heat numbers when applicable to assure the maintenance of identification and traceability throughout all stages of the project and to prevent the use of incorrect or defective material, parts or components.

4.8.4 Shelf/Operating Life

Items having limited calendar or operating life are controlled to preclude use after the shelf life or operating life has expired.

4.8.5 Maintaining Identification in Storage

Provisions are made in project procedures for maintenance or replacement of markings and identification due to damage from handling or aging, excessive deterioration due to environmental exposure, and for updating records while in storage.

4.9 Control of Special Processes

Processes are planned and performed under controlled conditions that ensure conformance to project requirements, quality system requirements, and applicable codes, standards, and regulations. Inspection, audit, assessment, surveillance, and non-destructive examination procedures are used to perform such verifications. Management is responsible for ensuring that only properly trained and qualified personnel are assigned to accomplish work activities and that they are provided adequate facilities, equipment, tools, and information to perform their work in compliance with requirements. Managers monitor the quality of activities through the results of in-process checks described in implementing procedures. These checks may be performed by co-workers or supervisory personnel independent of the work and provide a method of tracking and trending events that affect the quality, safety, or regulatory status of operations, products, and services.

4.9.1 General Processes

Instructions, procedures, drawings, checklists, process control documents, or other appropriate methods are used to control processes affecting the quality of items and services. When required, process parameters and environmental conditions are specified and maintained.

4.9.2 Special Processes

Special processes that control or verify quality are performed by qualified personnel using qualified procedures. Personnel, equipment, and procedures used to perform special processes are qualified in accordance with specified requirements. Qualified procedures for special processes include required conditions such as proper equipment, controlled parameters, and calibration requirements. Documentation of personnel,

equipment, and process qualifications is maintained in accordance with procedures..

4.10 Inspection

Quality Assurance, engineering, and technical support personnel are responsible for ensuring that inspections required to verify conformance of an item or activity to specified requirements are planned, executed, and documented by qualified personnel according to approved procedures.

ITDC Inspection requirements are addressed via a graded approach.

Equipment modifications, repairs, and replacement are inspected in accordance with the original design and inspection requirements unless an approved alternative exists.

4.10.1 Personnel

Inspection personnel are independent of those who performed the work being inspected. Personnel who verify conformance of work for acceptance are qualified to perform the inspection in accordance with approved procedures. Personnel in training for qualification as an inspector by on-the-job training are directly supervised by a qualified person who verifies the inspection results until qualification is achieved.

4.10.2 Inspection Hold Points

Responsibilities for identifying and specifying hold points are established in approved procedures. Quality Assurance, Engineering, and technical support representatives are responsible for identifying inspection hold points in appropriate documents to ensure that no further work is performed until a certain inspection has been completed. Work does not proceed beyond hold points without consent from the organization that established them. This consent is recorded prior to continuation of work.

4.10.3 Inspection Planning

Inspection procedures, instructions, or checklists identify the characteristics and activities to be inspected:

- acceptance criteria;
- responsible organization for performing inspection;
- and, provide for recording objective evidence of inspection results.

Planning also includes identification of hold or witness points;

- approval of data by supervisors to ensure that all inspection prerequisites and requirements have been satisfied, including operator and equipment qualifications;
- and, if applicable, establishment of sampling methods based on recognized standard practices, in accordance with approved procedures or project plans.

4.10.4 In-Process Inspection

Inspections are performed, as necessary, to verify conformance to requirements. Indirect control by monitoring may be utilized when direct inspection is impractical. Both inspection and monitoring are performed when control is inadequate without both. A combination of inspection and process monitoring is performed in a systematic manner to assure quality is achieved throughout the duration of the process.

4.10.5 Final Inspection

Final inspection includes a record review of the results of inspection and resolution of nonconformance's identified in previous inspections. Items are inspected for completeness, markings, calibration, adjustments, and protection from damage. The acceptance of the item will be documented and approved by authorized personnel. Modification, repair, or replacement requires re-inspection or retest to verify acceptability, as appropriate.

4.10.6 In-Service Inspection

In-service inspection methods are established to verify that the characteristics of an item continue to stay within the specified limits. Inspection methods include routine evaluation of emergency and safety systems, and verification of calibration or integrity of instruments or systems and their maintenance, as appropriate.

4.10.7 Inspection Records

Inspection records contain, at a minimum, identification of the item inspected, date of inspection, inspector name, type of observation, acceptance and rejection criteria, results or acceptability, and reference to nonconformance's.

4.11 Test Control

Testing to verify conformance of processes, equipment, and products to specified requirements and to demonstrate satisfactory performance is planned and

performed by qualified personnel in accordance with approved procedures. Tests required to collect data are planned, executed, documented, and evaluated.

ITDC Test Control requirements are addressed via a graded approach.

DCS tests will be performed in accordance with written test procedures that incorporate the requirements and acceptance criteria contained in the DCS system Safety Evaluation Report and Certificate of Compliance.

4.11.1 Test Requirements

Engineering and technical support representatives are responsible to ensure that test requirements and acceptance criteria are developed and incorporated into appropriate test plans, procedures, or checklists. The test methods and acceptance criteria are based on specified requirements contained in design or other technical documents. As appropriate, test plans are established, procedures developed, and results documented on checklists or other suitable records.

4.11.2 Test Procedures

Test procedures include or reference characteristics to be tested and test objectives and prerequisites. Prerequisites such as calibrated instrumentation, equipment and its condition, personnel qualification, environmental conditions, and collection and recording of data are taken into consideration during development of test procedures. Test procedures are reviewed and approved by cognizant technical, quality, and management personnel. Changes to test procedures are required to be reviewed and approved by the same, or equivalent, organization(s) as the original procedure.

4.11.3 Test Results

Test results are documented and evaluated by a responsible authority to assure the test requirements were satisfied. Records include as a minimum the item tested, date of test, name of the tester, environmental conditions, observations, acceptance and rejection criteria, results and acceptability, action taken for deviations noted, and name of the person evaluating results.

4.11.4 Testing after Modifications

Modification, repairs, or replacements shall be in accordance with the original design and test requirements or acceptable alternatives approved in the same, or equivalent, manner as the original.

4.11.5 Computer Program Testing

Testing of computer programs is performed in accordance with written procedures that address test requirements, verification methods, in-use tests, test results, and records requirements. Additional requirements regulating computer program testing are contained in Section 3 of this QAPP.

4.12 Control of Measuring and Test Equipment

Measuring and Test Equipment (M&TE) used for important-to-safety and DCS operations activities is controlled in accordance with approved procedures to ensure accuracy. The calibration process assures that all measuring instruments used in the acceptance of material, equipment, and assemblies are calibrated and properly adjusted at specified intervals to maintain accuracy within pre-determined limits. These procedures identify the responsible organizations, the devices to be controlled, the controlling and calibration methods, and calibration intervals to maintain accuracy within the necessary limits.

ITDC Control of Measuring and Test Equipment requirements are addressed via a graded approach.

Management is responsible for selecting the appropriate type, range, accuracy, and tolerance of M&TE to verify conformance to specified requirements.

M&TE is calibrated, adjusted, and maintained at scheduled intervals against certified equipment or standards having known valid relationships to nationally recognized standards, derived from accepted values for natural physical constants or by the ratio type of self-calibration. If no national standard exits, the basis of calibration is documented. The method and interval of calibration for each item is based on the type of device, stability characteristics, required accuracy, purpose, frequency of usage, and environment where it will be used.

Calibration methods are documented and performed by competent personnel in an environment that does not adversely affect the calibration. Special controls for usage, handling, and storage are documented and applied when they are required for environmental conditions such as temperature, humidity, cleanliness, or radiation to maintain accuracy or operating characteristics of the device.

When a M&TE device is found out of calibration, previous test results back to the previous acceptable calibration date are validated. Out-of-calibration devices are tagged or segregated until repaired and recalibrated or replaced.

Record of calibration history is maintained and equipment is marked to indicate calibration status. Documentation includes the equipment identification number, next calibration due date, and the inspector's or calibrator's signature or initials attesting to the accuracy and validity of the calibration.

4.13 Handling, Storage and Shipping

Materials considered critical, sensitive, perishable, or QA designated are handled, cleaned, stored, packaged, and shipped in accordance with controls identified in codes, standards, regulations, engineering specifications, or project requirements to prevent damage or loss and to minimize deterioration.

4.13.1 Instruction

Handling, storage, and shipping processes are conducted in accordance with written procedures, inspection instructions, drawings, specifications, vendor recommendations, or other documents, as appropriate. Information pertaining to shelf life, environment, packaging, temperature, cleaning, preservation, etc., is included, as required, to meet design, regulatory, and project requirements.

4.13.2 Requirements

When necessary for particular products, special protective environments, such as inert gas atmosphere, and specific moisture content and temperature levels, are specified and provided in applicable documents.

The use of special handling equipment or techniques is addressed in procedures. Special tools and equipment are inspected and tested in accordance with approved procedures that describe the inspection and test methods, time intervals, maintenance methods, and personnel qualifications and training requirements.

4.13.3 Marking

Suitable marking or labeling to identify, maintain, and preserve the item is provided during packaging, shipment, handling, and storage.

4.13.4 USNRC-Licensed Packages

ZionSolutions shall meet the requirements of 10CFR71, Subpart H and 10CFR72, Subpart G and DOT 49 CFR for restrictions concerning handling, storage, and shipping of NRC Licensed packages.

Transportation cask handling and operation shall conform to the handling and operating procedure for each licensed cask.

Prior to the shipment of a transport cask, conditions of the NRC's Certificate of Compliance (specifications, tests, and inspections) shall be satisfied. Required shipping papers shall be prepared and shall accompany the shipment in accordance with regulatory requirements and approved procedures.

Established safety restrictions concerning handling, storage, and shipping shall be included in the handling and operating procedures for storage and transport casks.

4.14 Inspection, Test, and Operating Status

Methods to indicate the status of inspections, tests, and operating status of systems for DCS, ISFSI, or spent fuel cask items and other selected tasks also include stamps, tags, or routing cards. Methods used will assure that required inspections and tests are performed and to assure that items which have not passed the required inspections or tests are not inadvertently installed, used or operated and to prevent inadvertent operation of systems. These methods provide for identification of items which have satisfactorily passed the required inspections and tests.

The status of items can be determined at any point throughout an operational process to prevent inadvertent use, installation, or operation of nonconforming or defective items. Status indicators are required to the extent possible to prevent operation of items that are removed from service for test, calibration, maintenance, or repair, and to ensure that required inspections and tests have been performed.

Status is identified by the use of tags, markings, stamps, or travelers. The authority for application and removal of status indicators is identified in approved procedures. Quality Assurance personnel routinely monitor project activities to assure status indicators are used and removed, as appropriate, in accordance with approved procedures.

4.15 Nonconforming Materials, Parts or Components

Items that do not conform to specified requirements are controlled to prevent inadvertent installation or use in accordance with approved procedures. Procedures include controls that provide for reporting, identifying, documenting, evaluating, segregating (when feasible), dispositioning nonconforming items, and notifying affected organizations.

ITDC Control of Nonconforming Conditions requirements are addressed via a graded approach.

Management is responsible for establishing an environment for identifying potential conditions adverse to quality. Management shall conduct analysis, as appropriate, to systematically determine significance of these conditions and actions appropriate to the conditions.

All project personnel are responsible for reporting nonconforming conditions. Management, at all levels, fosters a "no fault" attitude toward the identification of conditions that are adverse to quality, such as failures, malfunctions, nonconformances, and out-of-control processes including the failure to follow procedures. Nonconforming items are identified by using marking, tagging, or other means that do not adversely affect their end use.

To avoid inadvertent use, nonconforming items are segregated in holding areas when feasible, or in the case of large items, marking, or roping designates special storage areas.

Conditions that may be reportable per 10CFR72.242, 10CFR71.95, or 10CFR21, shall be reported in accordance with approved Quality Assurance procedures.

Management shall establish and implement a process for identifying, controlling, evaluating, and dispositioning nonconforming conditions. Such items, services or activities shall be documented and controlled to prevent inadvertent installation or use. Disposition of nonconformances shall be addressed in a timely manner by management. Personnel performing evaluations to determine a disposition shall have demonstrated competence in the specific area they are evaluating, have an adequate understanding of the requirements, and have access to pertinent background information. The disposition of nonconformances is evaluated and approved by QA. Disposition of a nonconformance, involving repair or use-as-is, is based on documented technical justification to assure continued compliance with design, regulatory, and contractual requirements, and may include provisions for retest or re-inspection to the original acceptance criteria. Any changes to design require the same design controls as those applied to the original design. Accept-as-is dispositions of materials and items

require engineering approval. Accepted deviations are reflected in as-built records.

Reports of nonconforming conditions are closed and documented by QA personnel and records are maintained in accordance with approved procedures. Reports of conditions that are adverse to quality are analyzed to identify trends in quality performance.

4.16 Corrective Action

Conditions adverse to quality (e.g., nonconformances, failures, malfunctions, deficiencies, defective material, etc.) are promptly identified and evaluated to determine corrective action in accordance with established procedures. The identification, cause, and corrective action for significant conditions adverse to quality shall be documented and reported to appropriate levels of management.

ITDC Corrective Action requirements are addressed via a graded approach.

Corrective action shall be promptly initiated when it is determined that a condition adverse to quality exists. In cases where it is not possible to accomplish a corrective action immediately, the appropriate management provides a written response describing the cause of the deficiency and the proposed corrective action to be completed within a specified time.

Management shall exercise controls to ensure that conditions adverse to quality are promptly detected and corrected or prevented, and ensure continuous quality improvement in project activities and products. The management control systems established includes problem investigation, evaluation, reporting, and follow-up action taken to verify that corrective action has been thoroughly implemented and such conditions are effectively resolved.

For significant conditions adverse to quality, the condition, the cause of the condition and the corrective action taken is documented and reported to appropriate levels of management. Follow-up action shall be taken to verify effective implementation of the required corrective actions to prevent recurrence and to verify that they are effectively implemented. The GM, or designee, is responsible for reviewing the condition and determining validity. The GM will assure that validated conditions are processed in accordance with the project's corrective action program.

The QAM has the authority to stop work or ensure adequate controls are in place until effective corrective action has been taken and any applicable changes have been incorporated in procedures and communicated to appropriate personnel.

The QAM will periodically analyze and assess CRs for apparent trends and conformance to performance indicators. The GM, or designee, will evaluate recommendations for consideration to improve or enhance procedures, systems or processes.

4.17 Quality Assurance Records

ITDC Quality Assurance Records requirements are addressed via a graded approach.

4.17.1 Record Management System

Quality Records shall be identified, controlled and stored in accordance with written procedures.

The record system includes the retention of those design, fabrication, inspection, operation, and surveillance records essential to demonstrate product quality. It provides for the identification of materials and their corresponding manufacturing, installation, inspection, test, and audit results. Requirements and responsibilities for the transmittal, distribution, retention, maintenance, and disposition of records are specified in approved procedures. QA records shall be protected against damage, deterioration, unauthorized change, or loss. For any work performed, the records to be generated must be identified, along with a means of matching the record to the item or activity to which it applies. Records must be legible, reproducible, and accurate.

4.17.2 Authentication

Documents shall be considered valid records only if stamped, initialed, or signed and dated by authorized personnel or otherwise authenticated, including the use of electronic approval and authorization. This 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. These records may be originals or reproduced copies.

4.17.3 Index

The records indexing system must include records identification, location of the record within the system, and minimum retention time. The records and/or indexing system(s) shall provide sufficient information to permit identification between the record and the items or activities to which it applies.

4.17.4 Distribution

The records shall be distributed, handled, and controlled in accordance with written procedures.

4.17.5 Classification of Records

Records shall be classified for retention and storage requirements as either lifetime or nonpermanent. Records that meet any of the following criteria are designated Lifetime records and must be maintained until completion of the project and turned over to Exelon if they will be of significant value in the following:

- Demonstrating the capability for safe operation.
- Determining the cause of an accident or the malfunction or failure of an item.
- Maintaining, reworking, repairing, replacing, or modifying an item.
- Providing required baseline data for in-service inspections.
- Used nuclear fuel records, including original fabrication, repair, and inspection
- ISFISI design and construction records
- DCS system design and fabrication records
- Fuel loading records

Project lifetime records shall include, as a minimum, design specifications, stress reports or stress calculations, "as-built" and interface control drawings, copies of material test reports, tabulation of materials for "as-built" configuration, NDE reports including examination reports, and nonconformance reports. Lifetime record retention is based on the life of the program, life of the item, life of the facility, or life of the license, as applicable.

Nonpermanent records are required to show evidence that an activity was performed in accordance with applicable requirements. Retention times must be established in writing.

QA records for packaging and transportation of radioactive materials include instructions, procedures, drawings, and closely related specifications such as required qualifications, procedures, and equipment. These records will be maintained for three years beyond the date Energy*Solutions* last engages in the packaging and transportation of

radioactive materials related to the Zion site under the rules of 10CFR71. Superseded procedures or instructions are retained for a minimum of three years after the procedure or instruction is superseded.

For subcontractors/sub-suppliers, the original QA record of the deliverables will be transmitted to Zion*Solutions* when applicable.

4.17.6 Correction

Methods of correcting errors shall be identified along with a means of documenting the authorized individual who made the corrections and the date.

4.17.7 Receipt Control

Each organization responsible for the receipt of records must designate an individual or organization responsible for receiving the records. Receipt control of records for permanent or temporary storage must include instructions for designating the required records to be controlled, identifying the records received, receiving and inspecting incoming records, determining the status, and forwarding to records storage facilities. Each receipt control system shall be structured to permit a current and accurate assessment of the status of records during the receiving process.

4.17.8 Storage Requirements

The records shall be stored in predetermined location(s) that meet the requirements of applicable standards, codes, and regulatory agencies. Prior to storage of records, a written storage procedure shall be prepared and responsibility assigned for enforcing the requirements of that procedure. This procedure shall include, as a minimum:

- A description of the storage facility;
- The filing system to be used;
- A method for verifying that the records received agree with the transmittal document and that the records are legible;
- A method of verifying that the records are those designated;
- The rules governing access to and control of the files;
- A method for controlling and accounting for records removed from the storage facility; and

- A method for filing supplemental information and disposing of superseded records.

Records shall be stored to prevent damage from moisture or temperature. All records maintained in hard copy form shall be firmly attached to binders or placed in folders, envelopes, or boxes for storage in file cabinets or within containers on shelving. Records may be stored in electronic media provided that the process for managing and storing the records are documented in approved procedures. Media used for the retention of records include, but are not limited to, microfilm, compact disks, magnetic media, optical disks, and hard disks. The format used must be capable of producing legible and complete documents during the entire retention period.

Records shall be stored in facilities that minimize the risk of damage or destruction from the following:

- Natural disasters such as wind, flood, or fires;
- Environmental conditions such as high and low temperatures and humidity; and
- Infestation by insects, mold, or rodents.

Records are maintained at an approved records storage facility or by storage of duplicate copies at separate geographical locations.

4.17.9 Authorized Personnel

Measures shall be established to preclude the entry of unauthorized personnel into the storage area. These measures shall guard against larceny and vandalism. Measures shall be taken to provide for replacement, restoration, or substitution of lost or damaged records.

4.17.10 Retrieval

Storage systems shall provide for retrieval of information in accordance with planned retrieval times based upon the record type. A list shall be maintained designating those personnel who shall have access to the files. Records maintained by the supplier at their facility or other location shall be accessible to the purchaser or their designated alternate.

4.17.11 Disposition

Records accumulated at Zion site shall be made accessible to Energy*Solutions* directly or through the procuring organization. These records shall be processed in accordance with this QAPP.

Various regulatory agencies have requirements concerning records that are within the scope of the QAPP. The most stringent requirements shall be used in determining the final disposition.

4.18 Audits

Planned internal audits are scheduled annually and performed per approved procedures or checklists. Elements of the QAPP will be audited at least annually to provide comprehensive, independent verification and evaluation of all aspects of the quality assurance program and to determine its effectiveness. Independent oversight of project activities will be accomplished by performing audits, surveillances, management assessments and/or independent assessments during the course of the Project. Scheduling, preparation, personnel selection, performance, reporting, response, follow-up action, and records management will be performed in accordance with Quality Procedures identified in the QA Program Implementation Matrix.

ITDC Audit requirements are addressed via a graded approach.

QA staff will perform project surveillances and overviews of deliverables to ensure compliance with the applicable QA requirements defined in this QAPP and as requested by the project team.

Audits of suppliers and subcontractors will be conducted as necessary but not less than once every three years to assess compliance with applicable requirements of this QAPP.

4.18.1 Scheduling, Preparation, and Performance

Internal and external audits are scheduled based on the status and importance of an activity. Schedules are updated as necessary to ensure that adequate coverage is maintained.

The audit scope shall encompass evaluation of quality system practices and/or procedures and the effectiveness of their implementation, monitoring of operations and activities, and a review of pertinent documents and their control and maintenance.

An audit team, composed of one or more qualified auditors is identified for each audit using personnel who have no direct responsibility for the activity being covered. A lead auditor, as a member of the team, is designated as a team leader.

The key elements of the audit program are:

- Scheduling and notifying management of scope and nature of audit
- Team selection, orientation, and planning
- Entrance conference
- Exit conference
- Reporting and response
- Follow-up action

4.18.2 Reporting, Response, Follow-up-Action, and Records

Audit reports are prepared upon completion of the audit and distributed to appropriate management for review and response. Management of the audited organizations provide a response to all identified conditions adverse to quality that includes corrective actions, including cause and action to prevent recurrence, and a schedule for completion, when applicable. Audit files are retained as quality records in accordance with approved procedures.

The results of internal audits, surveillances and assessments and independent assessments and audits of Subcontractors will be utilized as input into the continuous improvement program through identification in the CR system. Re-audit of deficient areas will be performed when required.

4.18.3 Surveillance

Surveillances are performed and documented when it is determined that it is necessary to monitor or observe an item or activity to verify conformance. Adequate demonstration of the areas covered by surveillance is a requirement to be considered as part of an effective audit program. Surveillance must be documented in sufficient detail to identify the activity covered, identify individuals doing surveillance, and to document results and any corrective measures necessary.

5.0 QUALITY MONITORING

Quality Assurance will utilize performance data from the project's CR system, Subcontractor corrective action systems, QA audit, surveillance, and assessment results to monitor the quality of project tasks and deliverables. This data will be used in determining areas requiring increased or decreased review by the established overview mechanisms. Data reviews will be performed on a periodic basis, but may be generated more frequently as necessary.

The QAM, using data from the project's CR system, also will perform trending of Zion*Solutions* quality activities. Trends identified will be reviewed by the QAM and appropriate actions will be developed to improve work activities and/or processes. Trending may result in Apparent Cause Evaluation (ACE) and/or Root Cause Analyses (RCA) as necessary.

6.0 ZION*SOLUTIONS* QUALITY COUNCIL

Zion*Solutions* will collaborate with its subcontractors and establish a committee to coordinate the quality overview of design, engineering, fabrication, installation and operation activities of the project including the implementation of the QAPP. The Zion*Solutions* Quality Council consists of key QA members of Zion*Solutions*, Energy*Solutions*, DFSS Designer, Design Authorities, and other supplier/subcontractor organizations. The Quality Council provides a united effort to coordinate, monitor, and effectively implement the project's oversight activities.

The Council will establish, review and evaluate quality performance indicators, discuss quality issues/concerns and assure effective corrective actions are implemented in a timely fashion. The Council will assure that design, fabrication, installation and operations activities are thoroughly and effectively overviewed and minimize duplication of oversight efforts.

It should be noted that the QAM has the primary responsibility for implementing this QAPP, and, in part, based upon supplier/subcontractor inputs will introduce and discuss Zion*Solutions* quality issues and topics to the committee.

7.0 REFERENCES

ANSI/ASME NQA-1-1994 Edition, "Quality Assurance Requirements for Nuclear Facility Applications."

Title 10 of the Code of Federal Regulations, Part 21, "Reporting of Defects and Noncompliance."

Title 10 of the Code of Federal Regulations, Part 50 Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants."

Title 10 of the Code of Federal Regulations, Part 71, Subpart H, "Quality Assurance Requirements for Packaging and Transportation of Radioactive Waste."

Title 10 of the Code of Federal Regulations, Part 72, Subpart G, "Quality Assurance Requirements for the Independent Storage of Spent Nuclear Fuel, High Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste."

NUREG/CR-6407 [INEL-95/0551], Classification of Transportation Packaging and Dry Spent Fuel Storage System Components According to Importance to Safety, February 1996.

NUREG-1536, "Standard Review Plan for Dry Cask Storage Systems," January 1997.

NUREG-1567, "Standard Review Plan for Spent Fuel Storage Facilities," Draft Report, October 1996.

NUREG-1617, "Standard Review Plan for Transportation Packages for Spent Nuclear Fuel," Draft Report, March 1998.

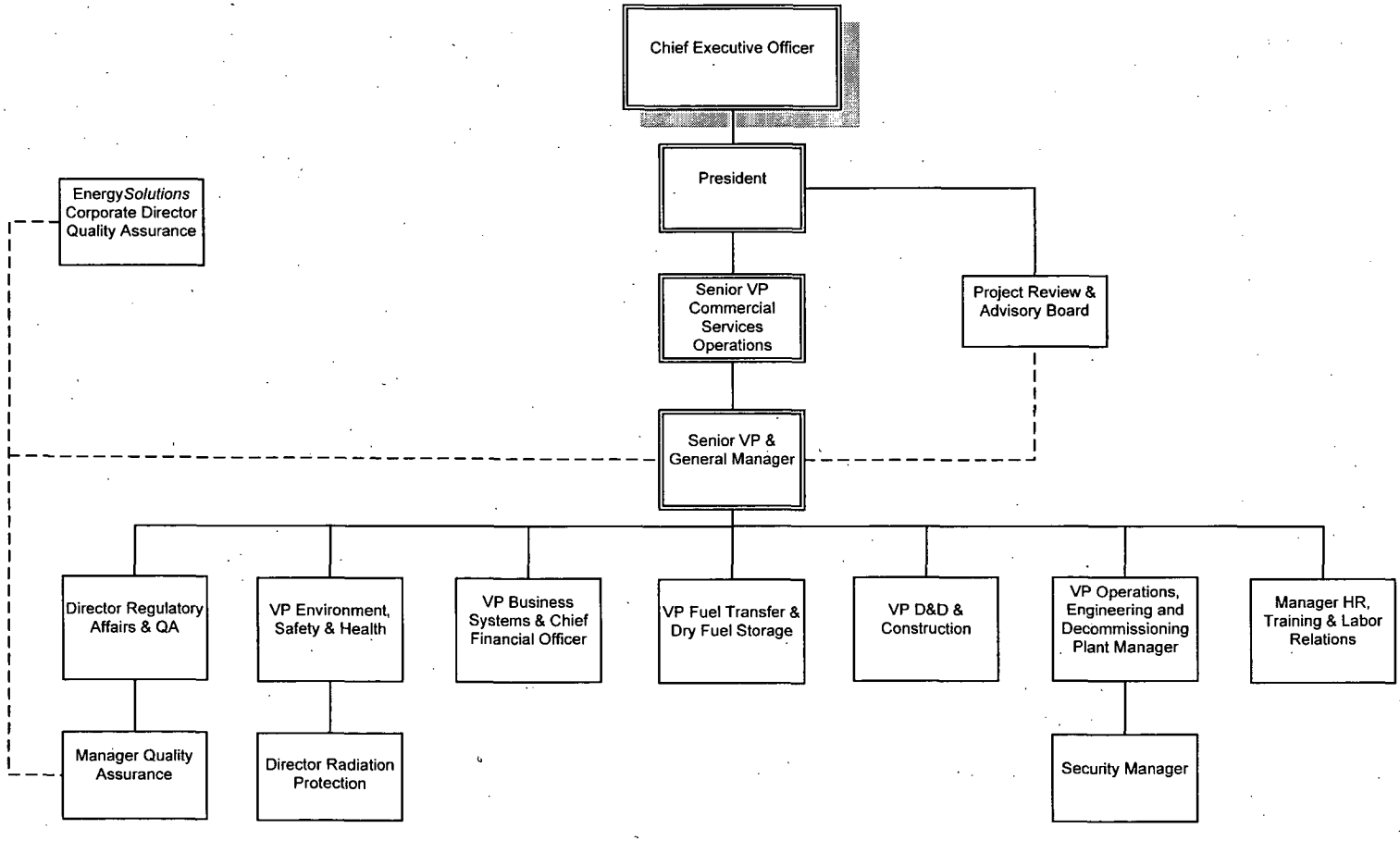
Regulatory Guide 7.10, "Establishing Quality Assurance Programs for Packaging Used in the Transport of Radioactive Material," Revision 1, June 1986.

Energy*Solutions* Quality Assurance Program, Rev. 0, effective May 31, 2007.

Exelon Quality Assurance Topical Report, Rev 81, implemented June 16, 2008.

Figure 1

Zion*Solutions* LLC
Restoration and Dry Cask Storage Project Organization Chart



Appendix A

List of Acronyms

ACE	Apparent Cause Evaluation
ASME	American Society of Mechanical Engineers
ANSI	American National Standards Institute
DCS	Dry Cask Storage
DFSS	Dry Fuel Storage System
ISFSI	Independent Spent Fuel Storage Installation
ITDC	Important to the Defueled Condition
ITS	Important To Safety
NUREG	Nuclear Regulatory Guide
PTSP	Project Technical Support Personnel
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
RCA	Root Cause Analysis
SAFSTOR	Safe Storage
SSC	Structures, Systems, and Components
USNRC	United States Nuclear Regulatory Commission

Enclosure 2

Quality Assurance Project Plan (QAPP) Commitments to NQA-1

The Zion*Solutions* QAPP contains explicit commitments to applicable quality assurance requirements of ASME NQA-1-1994 Part I. The acceptability of the use of NQA-1-1994, Part I, is based on the NRC's Safety Evaluation for consolidation of the Exelon Quality Assurance Program, which is contained in the letter from Mahesh Chawla (NRC) to John L. Skolds (Exelon Generation Company), "Approval of Proposed Revision 70 of Quality Assurance Topical Report EGC-1A, Rev. 70, in Accordance with 10 CFR 50.54(a) Requirements for Exelon/Amergen Plants," dated December 24, 2002. This Safety Evaluation indicates the NRC has "examined the side-by-side comparison of NQA-1-1983 and NQA-1-1994 equivalence, and concurs with the licensee's conclusions in finding NQA-1-1994, as implemented through the common QATR, to provide an acceptable basis for the licensee's operational QA program." The 1983 version of NQA-1 had been previously endorsed by NRC through Regulatory Guide 1.28, Revision 3, August 1985. In the QAPP Zion*Solutions* commits to implementation of Part I of the 1994 edition of NQA-1. A QAPP Compliance Matrix (Enclosure 3) demonstrates that the Zion*Solutions* QAPP fully meets the applicable requirements of NQA-1-1994 Part I, 10 CFR50 Appendix B, 10 CF71 Subpart H, and 10 CFR72 Subpart G.

In addition, it is Zion*Solutions*' intent to utilize certain portions of NQA-1-1994, Part II in its QAPP. Six Subparts in NQA-1 Part II represent incorporation of requirements from ANSI Standards. These are Subpart 2.1 (ANSI N45.2.1), Subpart 2.2 (N45.2.2), Subpart 2.3 (N45.2.3), Subpart 2.5 (N45.2.4), Subpart 2.5 (N45.2.5) and Subpart 2.8 (N45.2.8). Zion*Solutions* has performed a comparison of each of these ANSI Standards with the appropriate sections of Part II of NQA-1-1994 and finds that the requirements are essentially equivalent, and often identical. Therefore, Zion*Solutions* has included applicable portions of the appropriate sections of NQA-1-1994, Part II in the QAPP, in lieu of the associated ANSI Standards. In order to facilitate NRC review, Zion*Solutions* has enclosed with this letter, a matrix for each ANSI Standard (Enclosure 4) providing a comparison of the ANSI Standard with the appropriate NQA-1-1994, Part II section. Requirements for activities applicable to Zion which are similar to those addressed by Subparts 2.15 and 2.16, as applicable, are defined in the QAPP. Activities addressed by Subparts 2.18 and 2.20 do not apply to expected activities at Zion and are not addressed in the QAPP. In cases where supplemental requirements are determined to be needed to facilitate site activities, useful provisions of the NQA-1 Subparts or other industry guidelines or standards will be incorporated into applicable procedures or instructions.

Enclosure 3

Zion*Solutions* Quality Assurance Project Plan (ZS-QA-10)
QAPP Compliance Matrix

Zion*Solutions* QAPP SECTION 4.1	10CFR50 Appendix B CRITERIA I ORGANIZATION	NQA-1-1994 BASIC REQUIREMENT 1 ORGANIZATION	10CFR71 71.103 QUALITY ASSURANCE ORGANIZATION	10 CFR72 72.142 QUALITY ASSURANCE ORGANIZATION
The Zion Restoration and DCS Project organization, authority, duties, responsibilities, and interface requirements are addressed in QAPP Section 2.0, Quality Responsibilities. These activities include performing activities affecting the functions of structures, systems, and components which are important to safety, those associated with attaining quality objectives, and the QA functions. The primary Zion Restoration and DCS Project organizations are ZionSolutions, EnergySolutions, DFSS Designer, DFSS Prime Fabricator(s), and Design Authorities.	The authority and duties of persons and organizations performing activities affecting the safety-related functions of structures, systems and components shall be clearly established and delineated in writing. These activities include both the performing functions of attaining quality objectives and the quality assurance functions.	The organizational structure, functional responsibilities, levels of authority, and lines of communication for activities affecting quality shall be documented.	(a) The licensee, certificate holder, and applicant for a CoC shall be responsible for the establishment and execution of the quality assurance program. The licensee, certificate holder, and applicant for a CoC may delegate to others, such as contractors, agents, or consultants, the work of establishing and executing the quality assurance program, or any part of the quality assurance program, but shall retain responsibility for the program. These activities include performing the functions associated with attaining quality objectives and the quality assurance functions.	(a) The licensee, applicant for a license, certificate holder, and applicant for a CoC shall be responsible for the establishment and execution of the quality assurance program. The licensee and certificate holder may delegate to others, such as contractors, agents, or consultants, the work of establishing and executing the quality assurance program, but the licensee and the certificate holder shall retain responsibility for the program. The licensee, applicant for a license, certificate holder, and applicant for a CoC shall clearly establish and delineate in writing the authority and duties of persons and organizations performing activities affecting the functions of structures, systems, and components which are important to safety. These activities include performing the functions associated with attaining quality objectives and the quality assurance functions.

Enclosure 3

Zion*Solutions* Quality Assurance Project Plan (ZS-QA-10)
QAPP Compliance Matrix

Zion*Solutions* QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
Quality Assurance staff shall have sufficient independence from cost and schedule considerations and shall have the access to work areas and organizational freedom to effectively identify quality problems, initiate, recommend or provide solution to quality problems through designated channels, verify implementation of solutions; and assure that further processing, delivery, installation, and use are controlled until proper disposition of a nonconformance, deficiency, or unsatisfactory condition has occurred. The QAM has the authority to stop work when significant conditions adverse to quality warrant such action.	The persons and organizations performing quality assurance functions shall have sufficient authority and organizational freedom to identify quality problems; to initiate, recommend, or provide solutions; and to verify implementation of solutions.	Persons or organizations responsible for assuring than an appropriate QA program is established and verifying that activities affecting quality have been correctly performed shall have sufficient authority, access to work areas, and organizational freedom to: • Identify quality problems; • Initiate, recommend or provide solution to quality problems through designated channels; • Verify implementation of solutions; and • Assurance that further processing, delivery, installation, or use is controlled until proper disposition of a nonconformance, deficiency, or unsatisfactory condition has occurred.	(c) The persons and organizations performing quality assurance functions must have sufficient organizational freedom to identify quality problems; to initiate, recommend, or provide solutions; and to verify implementation of solutions.	(2) The persons and organizations performing quality assurance functions shall have sufficient authority and organizational freedom to identify quality problems; to initiate, recommend, or provide solutions; and to verify implementation of solutions.
Quality Assurance staff shall have sufficient independence from cost and schedule considerations and shall have the access to work areas and organizational freedom to effectively identify quality problems, initiate, recommend or provide solution to quality problems through designated channels, verify implementation of solutions; and assure that further processing, delivery, installation, and use are	Such persons and organizations performing quality assurance functions shall report to a management level such that this required authority and organizational freedom, including sufficient independence from cost and schedule when opposed to safety considerations, are provided.	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 such that required authority and organizational freedom are provided, including sufficient independence from cost and schedule considerations.	(d) The persons and organizations performing quality assurance functions shall report to a management level which assures that the required authority and organizational freedom, including sufficient independence from cost and schedule when opposed to safety considerations, are provided.	(c) The persons and organizations performing quality assurance functions shall report to a management level that ensures that the required authority and organizational freedom, including sufficient independence from cost and schedule considerations when these conditions are opposed to safety considerations, are provided.

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
controlled until proper disposition of a nonconformance, deficiency, or unsatisfactory condition has occurred. The QAM has the authority to stop work when significant conditions adverse to quality warrant such action.				
Quality Assurance staff shall have sufficient independence from cost and schedule considerations and shall have the access to work areas and organizational freedom to effectively identify quality problems, initiate, recommend or provide solution to quality problems through designated channels, verify implementation of solutions; and assure that further processing, delivery, installation, and use are controlled until proper disposition of a nonconformance, deficiency, or unsatisfactory condition has occurred.			(e) Because of the many variables involved, such as the number of personnel, the type of activity being performed, and the location or locations where activities are performed, the organizational structure for executing the quality assurance program may take various forms provided that the persons and organizations assigned the quality assurance functions have the required authority and organizational freedom.	(c) Because of the many variables involved, such as the number of personnel, the type of activity being performed, and the location or locations where activities are performed, the organizational structure for executing the quality assurance program may take various forms provided that the persons and organizations assigned the quality assurance functions have the required authority and organizational freedom.
Quality Assurance staff shall have sufficient independence from cost and schedule considerations and shall have the access to work areas and organizational freedom to effectively identify quality problems, initiate, recommend or provide solution to quality problems through designated channels, verify implementation of solutions; and assure that further processing, delivery,			(f) Irrespective of the organizational structure, the individual(s) assigned the responsibility for assuring effective execution of any portion of the quality assurance program at any location where activities subject to this section are being performed must have direct access to the levels of management necessary to perform this function.	(c) Irrespective of the organizational structure, the individual(s) assigned the responsibility for assuring effective execution of any portion of the quality assurance program, at any location where activities subject to this section are being performed, must have direct access to the levels of management necessary to perform this function.

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
installation, and use are controlled until proper disposition of a nonconformance, deficiency, or unsatisfactory condition has occurred.				
SECTION 4.2	**CRITERIA II Quality Assurance Program**	**BASIC REQUIREMENT 2 Quality Assurance Program**	**71.105 QUALITY ASSURANCE PROGRAM**	**72.144 QUALITY ASSURANCE PROGRAM**
Procedures describe how ZionSolutions implements the requirements of the QAPP. These procedures document methods for planning, reviewing, implementing, controlling, and verifying activities affecting quality.	The program shall be documented by written policies, procedures, or instructions and shall be carried out throughout plant life in accordance with policies, procedures, or instructions.	A documented quality assurance program shall be planned, implemented, and maintained in accordance with this Part (Part I), or portions thereof.	(a) The licensee shall document the quality assurance program by written procedures or instructions and shall carry out the program in accordance with those procedures throughout the period during which packaging is used.	(a) The licensee, applicant for a license, certificate holder, and applicant for a CoC shall document the quality assurance program by written procedures or instructions and shall carry out the program in accordance with those procedures throughout the period during which the ISFSI or MRS is licensed or the spent fuel storage cask is certified.
The QAPP shall apply to all activities that are important-to-safety or DCS operations and require compliance with applicable sections of the documents listed below: • 10CFR50, App. B • 10CFR71, Subpart H • 10CFR72, Subpart G • ANSI/ASME NQA-1-1994 The applicability of the QAPP takes into consideration the regulatory requirements for important-to-safety and DCS operations items and activities,	The applicant shall identify the structures, systems, and components to be covered by the quality assurance program and the major organizations participating in the program, together with the designated functions of these organizations.	The program shall identify the activities and items to which it applies.	(a) The licensee shall identify the material and components to be covered by the quality assurance program, the major organizations participating in the program, and the designated functions of these organizations.	(a) The licensee, applicant for a license, certificate holder, and applicant for a CoC shall identify the structures, systems, and components to be covered by the quality assurance program, the major organizations participating in the program, and the designated functions of these organizations.

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
as well as their complexity and impact on safety, the need for special controls, demonstration of compliance through inspection and test, and the degree of standardization of the item. The requirements of the QAPP are implemented using a graded approach allowing control over items and activities to be commensurate with their importance and level of risk and are not reductions in quality requirements. Measures are established for identifying the components, systems, and structures to be covered by the QAPP. During the planning of an activity or design of an item the QAPP requirements will be implemented through procedures.				
		The establishment of the program shall include consideration of the technical aspects of the activities affecting quality.	(c) The licensee shall base the requirements and procedures of its quality assurance program on the following consideration concerning the complexity and proposed use of the package and its components: (1) The impact of malfunction or failure of the item to safety; (2) The design and fabrication complexity or uniqueness of the item; (3) The need for special controls and surveillance over processes and	(c) The licensee, applicant for a license, certificate holder, and applicant for a CoC shall base the requirements and procedures of their quality assurance program(s) on the following considerations concerning the complexity and proposed use of the structures, systems, or components: (1) The impact of malfunction or failure of the item to safety; (2) The design and fabrication complexity or uniqueness of the item;

Enclosure 3

ZionSolutions Quality Assurance Project Plan (ZS-QA-10)
QAPP Compliance Matrix

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
			equipment; (4) The degree to which functional compliance can be demonstrated by inspection or test; and (5) The quality history and degree of standardization of the item.	(3) The need for special controls and surveillance over processes and equipment; (4) The degree to which functional compliance can be demonstrated by inspection or test; and (5) The quality history and degree of standardization of the item.
The requirements of the QAPP are implemented using a graded approach allowing control over items and activities to be commensurate with their importance and level of risk and are not reductions in quality requirements.	The quality assurance programs shall provide control over activities affecting the quality of the identified structures, systems, and components, to an extent consistent with their importance to safety.	The program shall provide control over activities affecting quality to an extent consistent with their importance.	(b) The licensee, through its quality assurance program, shall provide control over activities affecting the quality of the identified materials and components to an extent consistent with their importance to safety, and as necessary to assure compliance to the approved design of each individual package used for the shipment of radioactive material.	(b) The licensee, applicant for a license, certificate holder, and applicant for a CoC, through their quality assurance program(s), shall provide control over activities affecting the quality of the identified structures, systems, and components to an extent commensurate with the importance to safety, and as necessary, to ensure conformance with the approved design of each ISFSI, MRS, or spent fuel storage cask.
	The applicant shall establish at the earliest practicable time, consistent with the schedule for accomplishing the activities, a quality assurance program which complies with the requirements of this Appendix.	The program shall be established at the earliest time consistent with the schedule for accomplishing the activities.	(a) The licensee shall establish, at the earliest practicable time consistent with the schedule for accomplishing the activities, a quality assurance program which complies with the requirements of 71.101 through 71.137.	(a) The licensee, applicant for a license, certificate holder, and applicant for a CoC shall establish, at the earliest practicable time consistent with the schedule for accomplishing the activities, a quality assurance program which complies with the requirements of this subpart.
The management team provides systematic planning to establish the scope of work, analyze	Activities affecting quality shall be accomplished under suitably controlled conditions.	The program shall provide for the planning and accomplishment of activities affecting quality under	(b) The licensee's shall assure that activities affecting quality are accomplished under suitably	(b) The licensee, applicant for a license, certificate holder, and applicant for a CoC shall ensure

Enclosure 3

ZionSolutions Quality Assurance Project Plan (ZS-QA-10)
QAPP Compliance Matrix

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
hazards, and confirm the appropriateness of methods to be used and controls to be applied.		suitably controlled conditions.	controlled conditions.	that activities affecting quality are accomplished under suitably controlled conditions.
The management team provides systematic planning to establish the scope of work, analyze hazards, and confirm the appropriateness of methods to be used and controls to be applied. All activities affecting quality are accomplished under suitably controlled conditions. Controlled conditions include the use of appropriate equipment, suitable environmental conditions for accomplishing the activity, and assurance that prerequisites for the given activity have been satisfied. Management provides for any special control, processes, test equipment, tools, and skills to attain the required quality and for verification of quality.	Controlled conditions include the use of appropriate equipment; suitable environmental conditions for accomplishing the activity, such as adequate cleanliness; and assurance that all prerequisites for the given activity have been satisfied.	Controlled conditions include the use of appropriate equipment, suitable environmental conditions for accomplishing the activity, and assurance that prerequisites for the given activity have been satisfied.	(b) Controlled conditions include the use of appropriate equipment; suitable environmental conditions for accomplishing the activity, such as adequate cleanliness; and assurance that all prerequisites for the given activity have been satisfied.	(b) Controlled conditions include the use of appropriate equipment; suitable environmental conditions for accomplishing the activity, such as adequate cleanliness; and assurance that all prerequisites for the given activity have been satisfied.
The management team provides systematic planning to establish the scope of work, analyze hazards, and confirm the appropriateness of methods to be used and controls to be applied. All activities affecting quality are accomplished under suitably controlled conditions. Controlled conditions include the use of appropriate equipment, suitable environmental conditions for	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 and test.	The program shall provide for any special control, processes, test equipment, tools, and skills to attain the required quality and for verification of quality.	(b) The licensee 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 and test.	(b) The licensee 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 and test.

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
accomplishing the activity, and assurance that prerequisites for the given activity have been satisfied. Management provides for any special control, processes, test equipment, tools, and skills to attain the required quality and for verification of quality.				
Section 4.1: Quality Assurance staff shall have sufficient independence from cost and schedule considerations and shall have the access to work areas and organizational freedom to effectively identify quality problems, initiate, recommend or provide solution to quality problems through designated channels, verify implementation of solutions; and assure that further processing, delivery, installation, and use are controlled until proper disposition of a nonconformance, deficiency, or unsatisfactory condition has occurred.			71.103 (c) The persons and organizations performing quality assurance functions must have sufficient organizational freedom to identify quality problems; to initiate, recommend, or provide solutions; and to verify implementation of solutions.	72.142 (2) The persons and organizations performing quality assurance functions shall have sufficient authority and organizational freedom to identify quality problems; to initiate, recommend, or provide solutions; and to verify implementation of solutions.
Indoctrination and training are conducted as necessary to assure suitable proficiency is achieved and maintained. Project personnel shall be trained in the applicable procedures and project-specific documents.	The program shall provide for indoctrination and training of personnel performing activities affecting quality as necessary to assure that suitable proficiency is achieved and maintained.	The program shall provide for indoctrination and training, as necessary, of personnel performing activities affecting quality to assure that suitable proficiency is achieved and maintained.	(d) The licensee shall provide for indoctrination and training of personnel performing activities affecting quality as necessary to assure that suitable proficiency is achieved and maintained.	(d) The licensee, applicant for a license, certificate holder, and applicant for a CoC shall provide for indoctrination and training of personnel performing activities affecting quality as necessary to ensure that suitable proficiency is achieved and maintained.

Enclosure 3

ZionSolutions Quality Assurance Project Plan (ZS-QA-10)
QAPP Compliance Matrix

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
Managers are required to assess the effectiveness of their own operations and implementation of their portion of the QAPP. QA personnel perform independent audits, surveillances, and inspections to verify the effectiveness of the QAPP.	The applicant shall review the status and adequacy of the quality assurance program. Management of other organizations participating in the quality assurance program shall regularly review the status and adequacy of that part of the quality assurance program which they are executing.	Management of those organizations implementing the quality assurance program, or portions thereof, shall regularly assess the adequacy of that part of the program for which they are responsible and shall assure its effective implementation.	(d) The licensee shall review the status and adequacy of the quality assurance program at established intervals. Management of other organizations participating in the quality assurance program shall regularly review the status and adequacy of that part of the quality assurance program which they are executing.	(e) The licensee, applicant for a license, certificate holder, and applicant for a CoC shall review the status and adequacy of the quality assurance program at established intervals. Management of other organizations participating in the quality assurance program shall regularly review the status and adequacy of that part of the quality assurance program which they are executing.
SECTION 4.3	**CRITERIA III DESIGN CONTROL**	**BASIC REQUIREMENT 3 DESIGN CONTROL**	**71.107 PACKAGE DESIGN CONTROL**	**72.146 DESIGN CONTROL**
Design Control procedures ensure that the design meets applicable regulatory requirements, and that design activities are carried out in a planned and controlled manner. Procedures describe responsibilities for design interface, control, verification, and change. Approved procedures govern translation of applicable project and regulatory requirements and design bases into design, procurement, and procedural documents, as well as controlling the design documents and design document distribution. Design controls shall be applied to: criticality physics, radiation shielding, stress, thermal, hydraulic, accident analysis, compatibility of materials,	Measures shall be established to assure that applicable regulatory requirements and the design basis, as defined in 10CFR 50.2 and as specified in the license application, for those structures, systems, and components to which this Appendix applies, are correctly translated into specifications, drawings, procedures, and instructions. Design control measures shall be applied to items such as the following: reactor physics, stress, thermal, hydraulic, and accident analyses; compatibility of materials; accessibility for inservice inspection, maintenance and repair, the delineation of acceptance criteria for inspections and tests.	The design shall be defined, controlled, and verified.	(a) The licensee shall establish measures to assure that applicable regulatory requirements and the package design, as specified in the license for those materials and components to which this section applies, are correctly translated into specifications, drawings, procedures, and instructions. (b) The licensee shall apply any design control measures to items such as the following: 1) Criticality physics, radiation shielding, stress, thermal, hydraulic, and accident analyses; 2) Compatibility of materials; 3) Accessibility for inservice inspection, maintenance and repair, 4) Features to facilitate decontamination; and	(a) The licensee, applicant for a license, certificate holder, and applicant for a CoC shall establish measures to ensure that applicable regulatory requirements and the design basis, as specified in the license or CoC application for those structures, systems, and components to which this section applies, are correctly translated into specifications, drawings, procedures, and instructions. (a) The licensee, applicant for a license, certificate holder, and applicant for a CoC shall apply design control measures to items such as the following: criticality physics, radiation shielding, stress, thermal, hydraulic, and accident analyses; compatibility of materials; accessibility for inservice inspection,

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
accessibility for in-service inspection, maintenance and repair, features to facilitate decontamination, and delineation of acceptance criteria for inspections and tests.			5) Delineation of acceptance criteria for inspections and tests.	maintenance and repair, features to facilitate decontamination; and delineation of acceptance criteria for inspections and tests.
The input used in each design is documented, reviewed, and approved in a timely manner by the responsible design organization. Documented design inputs provide the necessary level of detail to ensure the design activity can be carried out correctly and provides a consistent basis for making decisions, accomplishing design verification, and for evaluating changes. Changes from approved design inputs, including the reason for the changes, are documented, approved, and controlled. Design inputs including appropriate quality standards shall be specified in a timely basis and translated into applicable design documents. Deviations from the quality standards shall be controlled. Design measures shall include review for suitability of application for materials, parts, equipment and processes that are important to safety.	These measures shall include provisions to assure that appropriate quality standards are specified and included in design documents and that deviations from standards are controlled. Measures shall also be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems, and components.	Applicable design inputs shall be appropriately specified on a timely basis and correctly translated into design documents.	(a) These measures must include provisions to assure that appropriate quality standards are specified and included in design documents and that deviations from standards are controlled. Measures must be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the materials, parts, and components of the packaging that are important to safety.	(a) These measures must include provisions to ensure that appropriate quality standards are specified and included in design documents and that deviations from standards are controlled. Measures must be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the functions of the structures, systems, and components which are important to safety.

Enclosure 3

ZionSolutions Quality Assurance Project Plan (ZS-QA-10)
QAPP Compliance Matrix

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
Formal design interfaces are established when multiple organizations (internal or external) participate in the design process. Procedures are written that establish and document responsibility and authority for transmittal, review, approval, release, distribution, and revision of design inputs and design output documents.	Measures shall be established for the identification and control of design interfaces and for coordination among participating design organizations.	Design interfaces shall be verified and controlled.	(b) The licensee, certificate holder, and applicant for a CoC shall establish measures for the identification and control of design interfaces and for coordination among participating design organizations. These measures must include the establishment of written procedures, among participating design organizations, for the review, approval, release, distribution, and revision of documents involving design interfaces.	(b) The licensee, applicant for a license, certificate holder, and applicant for a CoC shall establish measures for the identification and control of design interfaces and for coordination among participating design organizations. These measures must include the establishment of written procedures among participating design organizations for the review, approval, release, distribution, and revision of documents involving design interfaces.
			(b) The design control measures must provide for verifying or checking the adequacy of design, by methods such as design reviews, alternate or simplified calculational methods, or by a suitable testing program.	(b) The design control measures must provide for verifying or checking the adequacy of design by methods such as design reviews, alternate or simplified calculational methods, or by a suitable testing program.
Independent personnel who have qualifications equal to those of the original design personnel perform design verification. This could include an engineering supervisor who initiated the design provided he/she did not specify a singular design approach or rule out certain design considerations. No individual is ever the verifier for his/her own work or input.	The verifying or checking process shall be performed by individuals or groups other than those who performed the original design, but who may be from the same organization.	Design adequacy shall be verified by persons other than those who designed the item.	(b) For the verifying or checking process, the licensee shall designate individuals or groups other than those who were responsible for the original design, but who may be from the same organization.	(b) For the verifying or checking process, the licensee and certificate holder shall designate individuals or groups other than those who were responsible for the original design, but who may be from the same organization.
Qualification testing (synonymous with design validation) provides the assurance that products conform			(b) Where a test program is used to verify the adequacy of a specific design feature in lieu of other verifying or checking	(b) Where a test program is used to verify the adequacy of a specific design feature in lieu of other verifying or checking

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
to defined user needs and requirements. Qualification tests of important-to-safety and DCS operations items validate and demonstrate the adequacy of performance under conditions that simulate the most severe design conditions in accordance with written test procedures and test specifications.			processes, the licensee, certificate holder, and applicant for a CoC shall include suitable qualification testing of a prototype or sample unit under the most adverse design conditions.	processes, the licensee and certificate holder shall include suitable qualification testing of a prototype or sample unit under the most adverse design conditions.
Changes to final design, field changes, and modifications are justified and subject to design control measures commensurate with those applied to the original design.	Design changes, including field changes, shall be subject to design control measures commensurate with those applied to the original design.	Design changes, including field changes, shall be governed by control measures commensurate with those applied to the original design.	(c) The licensee, certificate holder, and applicant for a CoC shall subject design changes, including field changes, to design control measures commensurate with those applied to the original design. Changes in the conditions specified in the CoC require prior NRC approval.	(c) The licensee, applicant for a license, certificate holder, and applicant for a CoC shall subject design changes, including field changes, to design control measures commensurate with those applied to the original design. Changes in the conditions specified in the license or CoC require prior NRC approval.
SECTION 4.4	**CRITERIA IV PROCUREMENT DOCUMENT CONTROL**	**BASIC REQUIREMENT 4 PROCUREMENT DOCUMENT CONTROL**	**71.109 PROCUREMENT DOCUMENT CONTROL**	**72.148 PROCUREMENT DOCUMENT CONTROL**
Controls for procured items and services are established in approved programs and procedures. These programs and procedures require the technical, quality, regulatory, and administrative requirements applicable to the procurement to be specified in procurement documents. To the extent necessary, procurement documents require suppliers to adequately implement a quality program consistent with the type	Measures shall be established to assure that applicable regulatory requirements, design bases, and other requirements which are necessary to assure adequate quality are suitably included in the documents for procurement of material, equipment, and services, whether purchased by the applicant or by its contractors or sub-contractors.	Applicable design bases and other requirements necessary to assure adequate quality shall be included or referenced in documents for procurement of items and services.	The licensee shall establish measures to assure adequate quality is required in the documents for procurement of material, equipment, and services, whether purchased by the licensee or by its contractors or sub-contractors.	The licensee, applicant for a license, certificate holder, and applicant for a CoC shall establish measures to assure that applicable regulatory requirements, design basis, and other requirements which are necessary to assure adequate quality are included or referenced in the documents for procurement of material, equipment, and services, whether purchased by the licensee, certificate holder, or by

Enclosure 3

ZionSolutions Quality Assurance Project Plan (ZS-QA-10)
QAPP Compliance Matrix

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
and use of the item or service being purchased.				their contractors and sub-contractors.
To the extent necessary, procurement documents require suppliers to adequately implement a quality program consistent with the type and use of the item or service being purchased	To the extent necessary, the procurement documents shall require contractors or subcontractors to provide a quality assurance program consistent with the applicable provisions of this Appendix.	To the extent necessary, procurement documents shall require Suppliers to have a quality assurance program consistent with the applicable requirements of this Part (Part1).	To the extent necessary, the licensee shall require contractors or subcontractors to provide a quality assurance program consistent with the applicable provisions of this part.	To the extent necessary, the licensee, applicant for a license, certificate holder, and applicant for a CoC, shall require contractors or subcontractors to provide a quality assurance program consistent with the applicable provisions of this subpart.
SECTION 4.5	**CRITERIA V INSTRUCTIONS, PROCEDURES, AND DRAWINGS**	**BASIC REQUIREMENT 5 INSTRUCTION, PROCEDURES, AND DRAWINGS**	**71.111 INSTRUCTIONS, PROCEDURES, AND DRAWINGS**	**72.150 INSTRUCTIONS, PROCEDURES, AND DRAWINGS**
Management is responsible for ensuring that important-to-safety and DCS operations activities are described in instructions, procedures, or drawings, which are prepared and approved prior to commencing activities. All project personnel are responsible to perform their activities in accordance with the requirements of these documents.	Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings.	Activities affecting quality shall be prescribed by and performed in accordance with documented instructions, procedures, or drawings of a type appropriate to the circumstances.	The licensee shall prescribe activities affecting quality by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall require that these instructions, procedures, and drawings be followed.	The licensee, applicant for a license, certificate holder, and applicant for a CoC shall prescribe activities affecting quality by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall require that these instructions, procedures, and drawings be followed.
These documents include appropriate quantitative and qualitative acceptance criteria to verify that the activity has been satisfactorily accomplished.	Instructions, procedures, or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished.	These documents shall include or reference appropriate quantitative or qualitative acceptance criteria for determining that prescribed activities have been satisfactorily accomplished.	The instructions, procedures, and drawings must include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished.	The instructions, procedures, and drawings must include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished.

Enclosure 3

ZionSolutions Quality Assurance Project Plan (ZS-QA-10)
QAPP Compliance Matrix

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
SECTION 4.6	**CRITERIA VI DOCUMENT CONTROL**	**BASIC REQUIREMENT 6 DOCUMENT CONTROL**	**71.113 DOCUMENT CONTROL**	**72.152 DOCUMENT CONTROL**
Documents that prescribe or affect quality are controlled to ensure that the proper revisions are used. Controlled documents include documentation for important-to-safety and DCS operations activities such as procedures, work instructions, and drawings. Project documents, including changes, shall be identified, prepared, reviewed, approved, maintained, revised, and controlled in accordance with the requirements of this QAPP.	Measures shall be established to control the issuance of documents such as instructions, procedures, and drawings, including changes thereto, which prescribe all activities affecting quality.	The preparation, issue, and change of documents that specify requirements or prescribe activities affecting quality shall be controlled to assure that correct documents are being employed.	The licensee shall establish measures to control the issuance of documents such as instructions, procedures, and drawings, including changes, which prescribe all activities affecting quality	The licensee, applicant for a license, certificate holder, and applicant for a CoC shall establish measures to control the issuance of documents such as instructions, procedures, and drawings, including changes, which prescribe all activities affecting quality.
Documents are reviewed for adequacy and approved for release by authorized personnel prior to issuance. Documents are issued to and used at the location where the activity is performed as specified in project procedures. Document changes are reviewed and approved in accordance with project procedures.	These measures shall assure that documents, including changes, are reviewed for adequacy and approved for release by authorized personnel and are distributed to and used at the location where the prescribed activity is performed.	Such documents, including changes thereto, shall be reviewed for adequacy and approved for release by authorized personnel.	These measures must assure that documents, including changes, are reviewed for adequacy, approved for release by authorized personnel, and distributed and used at the location where the prescribed activity is performed.	These measures must assure that documents, including changes, are reviewed for adequacy, approved for release by authorized personnel, and distributed and used at the location where the prescribed activity is performed. These measures must assure that changes to documents are reviewed and approved.
SECTION 4.7	**CRITERIA VII CONTROL OF PURCHASED MATERIAL, EQUIPMENT, AND SERVICES**	**BASIC REQUIREMENT 7 CONTROL OF PURCHASED ITEMS AND SERVICES**	**71.115 CONTROL OF PURCHASED MATERIAL, EQUIPMENT AND SERVICES**	**72.154 CONTROL OF PURCHASED MATERIAL, EQUIPMENT AND SERVICES**
ZionSolutions procurement controls establish measures to ensure those procured items and services for important-to-safety and DCS operations applications	Measures shall be established to assure that purchased material, equipment, and services, whether purchased directly or through contractors and	The procurement of items and services shall be controlled to assure conformance with specified requirements.	(a) The licensee shall establish measures to assure that purchased material, equipment, and services, whether purchased directly or through contractors	(a) The licensee, applicant for a license, certificate holder, and applicant for a CoC shall establish measures to ensure that purchased material,

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
are clearly and adequately specified in procurement documents. Receiving inspection shall be performed for purchased items that are important-to-safety or DCS operations related (including spare or replacement parts) to ensure that: – Items are properly identified and correspond to the receiving documentation. – Inspection records and certificates of conformance attesting to the acceptance of the items are available. – Items accepted and released are identified as to their inspection status prior to forwarding them to a controlled storage area or releasing them for installation or further work. – Physical attributes comply with specified requirements.	subcontractors, conform to the procurement documents.		and subcontractors, conform to the procurement documents.	equipment, and services, whether purchased directly or through contractors and subcontractors, conform to the procurement documents.
Project technical, procurement, and QA personnel participate, as appropriate, in evaluation of potential procurement sources performed by EnergySolutions' Corporate Quality Assurance Department or ZionSolutions QA staff. ZionSolutions' QA Department shall perform a third party review of EnergySolutions' audits to ensure they are acceptable to ZionSolutions'.	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, and examination of products upon delivery.	Such control shall provide for the following as appropriate: source evaluation and selection, evaluation of objective evidence of quality furnished by the Supplier, source inspection, audit, and examination of items or services upon delivery or completion.	(a) These measures must 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, and examination of products upon delivery.	(a) These measures must 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, and examination of products upon delivery.

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
ZionSolutions' recommendations of procurement sources are based on these evaluations. Results of supplier evaluations performed prior to contract award are documented and retained. The evaluations cover review of capabilities and facilities for technical, manufacturing, and quality performance, and include any or all of the following, as appropriate: – Historical performance data, particularly in product quality and delivery. – Review of supplier's QA Program, including current quality records. – Inspections, audits, or surveillances to verify supplier's QA Program implementation. – Source qualification programs. Receiving inspection shall be performed for purchased items that are important-to-safety or DCS operations related (including spare or replacement parts)				
Receiving inspection shall be performed for purchased items that are important-to-safety or DCS operations related (including spare or replacement parts) to ensure that:			(b) The licensee, certificate holder, and applicant for a CoC shall have available documentary evidence that material and equipment conform to the procurement specifications before installation or use of the	(b) The licensee, applicant for a license, certificate holder, and applicant for a CoC shall have available documentary evidence that material and equipment conform to the procurement specifications prior to installation

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
• Items are properly identified and correspond to the receiving documentation. • Inspection records and certificates of conformance attesting to the acceptance of the items are available. • Items accepted and released are identified as to their inspection status prior to forwarding them to a controlled storage area or releasing them for installation or further work. • Physical attributes comply with specified requirements. Records of such inspections and documentary evidence that material, equipment, and services conform to procurement specifications and documents shall be retained or be available prior to installation or use of the item, material, equipment or service, for the life of the package, and for the life of the ISFSI as applicable.			material and equipment. The licensee, certificate holder, and applicant for a CoC shall retain, or have available, this documentary evidence for the life of the package to which it applies. The licensee, certificate holder, and applicant for a CoC shall assure that the evidence is sufficient to identify the specific requirements met by the purchased material and equipment.	or use of the material and equipment. The licensee and certificate holder shall retain or have available this documentary evidence for the life of the ISFSI, MRS, or spent fuel storage cask. The licensee and certificate holder shall ensure that the evidence is sufficient to identify the specific requirements met by the purchased material and equipment.
A documented evaluation is required annually for suppliers maintained on the supplier list. Supplier audits, when required, shall be conducted at least once every thirty-six (36) months in accordance with the audit section of this document.			(c) The licensee, certificate holder, and applicant for a CoC shall assess the effectiveness of the control of quality by contractors and subcontractors at intervals consistent with the importance, complexity, and quantity of the product or services.	(c) The licensee, applicant for a license, certificate holder, and applicant for a CoC, or a designee of either, shall assess the effectiveness of the control of quality by contractors and subcontractors at intervals consistent with the importance, complexity, and quantity of the product or services.

Enclosure 3

ZionSolutions Quality Assurance Project Plan (ZS-QA-10)
QAPP Compliance Matrix

ZionSolutions QAPP SECTION 4.8	10CFR50 Appendix B CRITERIA VIII IDENTIFICATION AND CONTROL OF MATERIAL, PARTS, AND COMPONENTS	NQA-1-1994 BASIC REQUIREMENT 8 IDENTIFICATION AND CONTROL OF ITEMS	10CFR71 71.117 IDENTIFICATION AND CONTROL OF MATERIAL, PARTS AND COMPONENTS	10 CFR72 72.156 IDENTIFICATION AND CONTROL OF MATERIAL, PARTS, AND COMPONENTS
Controls are established in approved procedures to assure that only correct and accepted items are used or installed. The identification and control of material, parts, and components will include the use of heat numbers when applicable to assure the maintenance of identification and traceability throughout all stages of the project and to prevent the use of incorrect or defective material, parts or components.	Measures shall be established for the identification and control of materials, parts, and components including partially fabricated assemblies. These identification and control measures shall be designed to prevent the use of incorrect or defective material, parts and components.	Controls shall be established to assure that only correct and accepted items are used or installed.	The licensee shall establish measures for the identification and control of materials, parts, and components. These identification and control measures must be designed to prevent the use of incorrect or defective material, parts and components.	The licensee, applicant for a license, certificate holder, and applicant for a CoC shall establish measures for the identification and control of materials, parts, and components. These identification and control measures must be designed to prevent the use of incorrect or defective material, parts and components.
Identification is maintained either on the items or in documents traceable to the item. Identification such as batch, lot, serial number, or part number is maintained from initial receipt up to and including installation. The identification relates the item to the applicable design or other specification document when appropriate. ZionSolutions utilizes physical identification when possible. Other means, including separation or procedural control, are used when physical identification is not possible.		Identification shall be maintained either on the items or in documents traceable to the items, or in a manner which assures that identification is established and maintained.	These measures must assure that identification of the item is maintained by heat number, part number, or other appropriate means, either on the item or on records traceable to the item, as required throughout fabrication, installation, and use of the item.	These measures must ensure that identification of the item is maintained by heat number, part number, serial number, or other appropriate means, either on the item or on records traceable to the item as required, throughout fabrication, installation, and use of the item.

Enclosure 3

ZionSolutions Quality Assurance Project Plan (ZS-QA-10)
QAPP Compliance Matrix

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
SECTION 4.9	**CRITERIA IX CONTROL OF SPECIAL PROCESSES**	**BASIC REQUIREMENT 9 CONTROL OF PROCESSES**	**71.119 CONTROL OF SPECIAL PROCESSES**	**72.158 CONTROL OF SPECIAL PROCESSES**
Special processes that control or verify quality are performed by qualified personnel using qualified procedures. Personnel, equipment, and procedures used to perform special processes are qualified in accordance with specified requirements. Qualified procedures for special processes include required conditions such as proper equipment, controlled parameters, and calibration requirements.	Measures shall be established to assure that special processes, including welding, heat treating, and nondestructive testing, are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements.	Processes affecting quality of items or services shall be controlled.		
Special processes that control or verify quality are performed by qualified personnel using qualified procedures. Personnel, equipment, and procedures used to perform special processes are qualified in accordance with specified requirements. Qualified procedures for special processes include required conditions such as proper equipment, controlled parameters, and calibration requirements.		Special processes that control or verify quality, such as those used in welding, heat treating, and nondestructive examination, shall be performed by qualified personnel using qualified procedures in accordance with specified requirements.	The licensee shall establish measures to assure that special processes, including welding, heat treating, and nondestructive testing, are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements.	The licensee, applicant for a license, certificate holder, and applicant for a CoC shall establish measures to ensure that special processes, including welding, heat treating, and nondestructive testing, are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements.
SECTION 4.10	**CRITERIA X INSPECTION**	**BASIC REQUIREMENT 10 INSPECTION**	**71.121 INTERNAL INSPECTION**	**72.160 LICENSEE INSPECTION**
Quality Assurance, engineering, and technical support personnel are responsible for ensuring that inspections required to verify conformance of an item or	A program for inspection of activities affecting quality shall be established and executed by or for the organization performing the activity to verify conformance	Inspections required to verify conformance of an item or activity to specified requirements shall be planned and executed.	The licensee shall establish and execute a program for inspection of activities affecting quality by or for the organization performing the activity to verify conformance	The licensee, applicant for a license, certificate holder, and applicant for a CoC shall establish and execute a program for inspection of activities

Enclosure 3

ZionSolutions Quality Assurance Project Plan (ZS-QA-10)
QAPP Compliance Matrix

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
activity to specified requirements are planned, executed, and documented by qualified personnel according to approved procedures.	with the documented instructions, procedures, and drawings for accomplishing the activity.		with the documented instructions, procedures, and drawings for accomplishing the activity.	affecting quality by or for the organization performing the activity to verify conformance with the documented instructions, procedures, and drawings for accomplishing the activity.
Inspection procedures, instructions, or checklists identify the characteristics and activities to be inspected: – acceptance criteria; – responsible organization for performing inspection; – and, provide for recording objective evidence of inspection results.		Characteristics to be inspected and inspection methods to be employed shall be specified.		
Quality Assurance, engineering, and technical support personnel are responsible for ensuring that inspections required to verify conformance of an item or activity to specified requirements are planned, executed, and documented by qualified personnel according to approved procedures. Inspection records contain, at a minimum, identification of the item inspected, date of inspection, inspector name, type of observation, acceptance and rejection criteria, results or acceptability, and reference to nonconformance's.		Inspection results shall be documented.		

Enclosure 3

Zion*Solutions* Quality Assurance Project Plan (ZS-QA-10)
QAPP Compliance Matrix

Zion*Solutions* QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
Inspection personnel are independent of those who performed the work being inspected.	Such inspection shall be performed by individuals other than those who performed the activity being inspected.	Inspection for acceptance shall be performed by persons other than those who performed or directly supervised the work being inspected.	The inspection must be performed by individuals other than those who performed the activity being inspected.	The inspection must be performed by individuals other than those who performed the activity being inspected.
Quality Assurance, engineering, and technical support personnel are responsible for ensuring that inspections required to verify conformance of an item or activity to specified requirements are planned, executed, and documented by qualified personnel according to approved procedures. Responsibilities for identifying and specifying hold points are established in approved procedures. Quality Assurance, Engineering, and technical support representatives are responsible for identifying inspection hold points in appropriate documents to ensure that no further work is performed until a certain inspection has been completed. Work does not proceed beyond hold points without consent from the organization that established them. This consent is recorded prior to continuation of work. Inspections are performed, as necessary, to verify conformance to requirements. Indirect control by monitoring may be utilized when direct inspection is impractical. Both inspection and			Examination, measurements, or tests of material or products processed must be performed for each work operation where necessary to assure quality. If direct inspection of processed material or products is not carried out, indirect control by monitoring processing methods, equipment, and personnel must be provided. Both inspection and process monitoring must be provided when quality control is inadequate without both. If mandatory inspection hold points, which require witnessing or inspecting by the licensee's designated representative and beyond which work should not proceed without the consent of its designated representative, are required, the specific hold points must be indicated in appropriate documents.	Examinations, measurements, or tests of material or products processed must be performed for each work operation where necessary to assure quality. If direct inspection of processed material or products cannot be carried out, indirect control by monitoring processing methods, equipment, and personnel must be provided. Both inspection and process monitoring must be provided when quality control is inadequate without both. If mandatory inspection hold points that require witnessing or inspecting by the licensee's or certificate holder's designated representative, and beyond which work should not proceed without the consent of its designated representative, are required, the specific hold points must be indicated in appropriate documents.

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
monitoring are performed when *control is inadequate without* both. A combination of inspection and process monitoring is performed in a systematic manner to assure quality is achieved throughout the duration of the process.				
SECTION 4.11	**CRITERIA XI TEST CONTROL**	**BASIC REQUIREMENT 11 TEST CONTROL**	**71.123 TEST CONTROL**	**72.162 TEST CONTROL**
Testing to verify conformance of processes, equipment, and products to specified requirements and to demonstrate satisfactory performance is planned and performed by qualified personnel in accordance with approved procedures. Tests required to collect data are planned, executed, documented, and evaluated. The test methods and acceptance criteria are based on specified requirements contained in design or other technical documents.	A test program shall be established to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents.	Tests required to verify conformance of an item or computer program to specified requirements and to demonstrate that items will perform satisfactorily in service shall be planned and executed.	The licensee shall establish a test program to assure that all testing required to demonstrate that the packaging components will perform satisfactorily in service is identified and performed in accordance with written test procedures that incorporate the requirements of this part and the requirements and acceptance limits contained in the package approval.	The licensee, applicant for a license, certificate holder, and applicant for a CoC shall establish a test program to ensure that all testing required to demonstrate that the structures, systems, and components will perform satisfactorily in service, is identified and performed in accordance with written test procedures that incorporate the requirements of this part and the requirements and acceptance limits contained in the ISFSI, MRS, or spent fuel storage license or CoC.
Engineering and technical support representatives are responsible to ensure that test requirements and acceptance criteria are developed and incorporated into appropriate test plans, procedures, or checklists. The test methods and acceptance criteria are based on specified requirements contained in design or other technical documents.		Characteristics to be tested and test methods to be employed shall be specified.		

Enclosure 3

ZionSolutions Quality Assurance Project Plan (ZS-QA-10)
QAPP Compliance Matrix

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
Test procedures include or reference characteristics to be tested and test objectives and prerequisites. Prerequisites such as calibrated instrumentation, equipment and its condition, personnel qualification, environmental conditions, and collection and recording of data are taken into consideration during development of test procedures.			The test procedures must include provisions for assuring that all prerequisites for the given test are met, that adequate test instrumentation is available and used, and that the test is performed under suitable environmental conditions.	The test procedures must include provisions to ensure that all prerequisites for the given test are met, that adequate test instrumentation is available and used, and that the test is performed under suitable environmental conditions.
Test results are documented and evaluated by a responsible authority to assure the test requirements were satisfied.		Test results shall be documented and their conformance with acceptance criteria shall be evaluated.	The licensee, certificate holder, and applicant for a CoC shall document and evaluate the test results to assure that test requirements have been satisfied.	The licensee, applicant for a license, certificate holder, and applicant for a CoC shall document and evaluate the test results to ensure that test requirements have been satisfied.
		Tests required to collect data, such as for siting or design input, shall be planned, executed, documented, and evaluated.		
SECTION 4.12	**CRITERIA XII CONTROL OF MEASURING AND TEST EQUIPMENT**	**BASIC REQUIREMENT 12 CONTROL OF MEASURING AND TEST EQUIPMENT**	**71.125 CONTROL OF MEASURING AND TEST EQUIPMENT**	**72.164 CONTROL OF MEASURING AND TEST EQUIPMENT**
The calibration process assures that all measuring instruments used in the acceptance of material, equipment, and assemblies are calibrated and properly adjusted at specified intervals to maintain accuracy within pre-determined limits.	Measures shall be established to assure that tools, gages, instruments, and other measuring and testing devices used in activities affecting quality are properly controlled, calibrated, and adjusted at specified periods to maintain accuracy within necessary limits.	Tools, gages, instruments, and other measuring and test equipment used for activities affecting quality shall be controlled and at specified periods calibrated and adjusted to maintain accuracy within necessary limits.	The licensee shall establish measures to assure that tools, gages, instruments, and other measuring and testing devices used in activities affecting quality are properly controlled, calibrated, and adjusted at specified times to maintain accuracy within necessary limits.	The licensee, applicant for a license, certificate holder, and applicant for a CoC shall establish measures to ensure that tools, gauges, instruments, and other measuring and testing devices used in activities affecting quality are properly controlled, calibrated, and adjusted at specified times to maintain accuracy within necessary limits.

Enclosure 3

ZionSolutions Quality Assurance Project Plan (ZS-QA-10)
QAPP Compliance Matrix

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
SECTION 4.13	**CRITERIA XIII HANDLING, STORAGE, AND SHIPPING**	**BASIC REQUIREMENT 13 HANDLING, STORAGE, AND SHIPPING**	**71.127 HANDLING, STORAGE, AND SHIPPING CONTROL**	**72.166 HANDLING, STORAGE, AND SHIPPING CONTROL**
Materials considered critical, sensitive, perishable, or QA designated are handled, cleaned, stored, packaged, and shipped in accordance with controls identified in codes, standards, regulations, engineering specifications, or project requirements to prevent damage or loss and to minimize deterioration.	Measures shall be established to control the handling, storage, shipping, cleaning, and preservation of materials and equipment in accordance with work and inspection instructions to prevent damage or deterioration.	Handling, storage, cleaning, packaging, shipping, and preservation of items shall be controlled to prevent damage or loss and to minimize deterioration.	The licensee shall establish measures to control, in accordance with instructions, the handling, storage, shipping, cleaning, and preservation of materials and equipment to be used in packaging to prevent damage or deterioration.	The licensee, applicant for a license, certificate holder, and applicant for a CoC shall establish measures to control, in accordance with work and inspection instructions, the handling, storage, shipping, cleaning, and preservation of materials and equipment to prevent damage or deterioration.
When necessary for particular products, special protective environments, such as inert gas atmosphere, and specific moisture content and temperature levels, are specified and provided in applicable documents.			When necessary for particular products, special protective environments, such as inert gas atmosphere, and specific moisture content and temperature levels must be specified and provided.	When necessary for particular products, special protective environments, such as inert gas atmosphere, and specific moisture content and temperature levels must be specified and provided.
SECTION 4.14	**CRITERIA XIV INSPECTION, TEST, AND OPERATING STATUS**	**BASIC REQUIREMENT 14 INSPECTION, TEST, AND OPERATING STATUS**	**71.129 INSPECTION, TEST AND OPERATING STATUS**	**72.168 INSPECTION, TEST AND OPERATING STATUS**
Methods used will assure that required inspections and tests are performed and to assure that items which have not passed the required inspections or tests are not inadvertently installed, used or operated and to prevent inadvertent operation of systems. These methods provide for identification of items which have	These measures shall provide for the identification of items which have satisfactorily passed required inspections and tests, where necessary to preclude inadvertent bypassing of such inspections and tests.	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;	(a) These measures must provide for the identification of items that have satisfactorily passed required inspections and tests where necessary to preclude inadvertent bypassing of the inspections and tests.	(a) These measures must provide for the identification of items which have satisfactorily passed required inspections and tests where necessary to preclude inadvertent bypassing of the inspections and tests.

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
satisfactorily passed the required inspections and tests.		used, or operated.		
Methods to indicate the status of inspections, tests, and operating status of systems for DCS, ISFSI, or spent fuel cask items and other selected tasks also include stamps, tags, or routing cards.	Measures shall be established to indicate, by the use of markings such as stamps, tags, labels, routing cards, or other suitable means, the status of inspections and tests performed upon individual items of the nuclear power plant and fuel reprocessing plant.	Status shall be maintained through indicators, such as physical location and tags, markings, shop travelers, stamps, inspection records, or other suitable means.	(a) The licensee shall establish measures to indicate, by use of markings such as stamps, tags, labels, routing cards, or other suitable means, the status of inspections and tests performed upon individual items of the packaging.	(a) The licensee shall establish measures to indicate, by use of markings such as stamps, tags, labels, routing cards, or other suitable means, the status of inspections and tests performed upon individual items of the ISFSI or MRS.
The authority for application and removal of status indicators is identified in approved procedures.		The authority for application and removal of tags, markings, labels, and stamps shall be specified.		
The status of items can be determined at any point throughout an operational process to prevent inadvertent use, installation, or operation of nonconforming or defective items. Status indicators are required to the extent possible to prevent operation of items that are removed from service for test, calibration, maintenance, or repair, and to ensure that required inspections and tests have been performed.	Measures shall also be established for indicating the operating status of structures, systems, and components of the nuclear power plant and fuel reprocessing plant, such as by tagging valves and switches, to prevent inadvertent operation.	Status indicators shall also provide for indicating the operating status of systems and components of the nuclear facility, such as by tagging valves and switches, to prevent inadvertent operation.	(b) The licensee shall establish measures to identify the operating status of components of the packaging, such as tagging valves and switches, to prevent inadvertent operation.	(b) The licensee shall establish measures to identify the operating status of structures, systems, and components of the ISFSI or MRS, such as tagging valves and switches, to prevent inadvertent operation.
SECTION 4.15	**CRITERIA XV NON-CONFORMING MATERIALS, PARTS, OR COMPONENTS**	**BASIC REQUIREMENT 15 CONTROL OF NONCONFORMING ITEMS**	**71.131 NONCONFORMING MATERIALS, PARTS, OR COMPONENTS**	**72.170 NONCONFOMRING MATERIALS, PARTS, OR COMPONENTS**
Items that do not conform to specified requirements are controlled to prevent inadvertent	Measures shall be established to control materials, parts, or components which do not	Items that do not conform to specified requirements shall be controlled to prevent inadvertent	The licensee shall establish measures to control materials, parts, or components that do not	The licensee, applicant for a license, certificate holder, and applicant for a CoC shall

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
installation or use in accordance with approved procedures.	conform to requirements in order to prevent their inadvertent use or installation.	installation or use.	conform to the licensee's requirements to prevent their inadvertent use or installation.	establish measures to control materials, parts, or components that do not conform to their requirements in order to prevent their inadvertent use or installation.
Procedures include controls that provide for reporting, identifying, documenting, evaluating, segregating (when feasible), dispositioning nonconforming items, and notifying affected organizations.	These measures shall include, as appropriate, procedures for identification, documentation, segregation, disposition, and notification to affected organizations.	Controls shall provide for identification, documentation, evaluation, segregation when practical, and disposition of nonconforming items, and for notification to affected organizations.	These measures must include, as appropriate, procedures for identification, documentation, segregation, disposition, and notification to affected organizations.	These measures must include, as appropriate, procedures for identification, documentation, segregation, disposition, and notification to affected organizations.
			Nonconforming items must be reviewed and accepted, rejected, repaired, or reworked in accordance with documented procedures.	Nonconforming items must be reviewed and accepted, rejected, repaired, or reworked in accordance with documented procedures.
SECTION 4.16	**CRITERIA XVI CORRECTIVE ACTION**	**BASIC REQUIREMENT 16 CORRECTIVE ACTION**	**71.133 CORRECTIVE ACTION**	**72.172 CORRECTIVE ACTION**
Conditions adverse to quality (e.g., nonconformances, failures, malfunctions, deficiencies, defective material, etc.) are promptly identified and evaluated to determine corrective action in accordance with established procedures.	Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected.	Conditions adverse to quality shall be identified promptly and corrected as soon as practical.	The licensee shall establish measures to assure that conditions adverse to quality, such as deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected.	The licensee, applicant for a license, certificate holder, and applicant for a CoC shall establish measures to ensure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected.
For significant conditions adverse to quality, the condition, the cause of the condition and the corrective action taken is documented and reported to appropriate levels of	In the case of a significant condition identified as adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to	In the case of a significant condition adverse to quality, the cause of the condition shall be determined and corrective action taken to preclude recurrence.	In the case of a significant condition adverse to quality, the measures must assure that the cause of the condition is determined and corrective action taken to preclude repetition.	In the case of a significant condition identified as adverse to quality, the measures must ensure that the cause of the condition is determined and corrective action taken to

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
management. Follow-up action shall be taken to verify effective implementation of the required corrective actions to prevent recurrence and to verify that they are effectively implemented.	preclude repetition.			preclude repetition.
For significant conditions adverse to quality, the condition, the cause of the condition and the corrective action taken is documented and reported to appropriate levels of management. Follow-up action shall be taken to verify effective implementation of the required corrective actions to prevent recurrence and to verify that they are effectively implemented. The GM, or designee, is responsible for reviewing the condition and determining validity. The GM will assure that validated conditions are processed in accordance with the project's corrective action program.	The identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken shall be documented and reported to appropriate levels of management.	The identification, cause, and corrective action for significant conditions adverse to quality shall be documented and reported to appropriate levels of management;	The identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken must be documented and reported to appropriate levels of management.	The identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken must be documented and reported to appropriate levels of management.
The management control systems established includes problem investigation, evaluation, reporting, and follow-up action taken to verify that corrective action has been thoroughly implemented and such conditions are effectively resolved. Follow-up action shall be taken to verify effective implementation of the required corrective actions to prevent recurrence and to verify that they are effectively implemented.		follow-up action shall be taken to verify implementation of this corrective action.		

Enclosure 3

ZionSolutions Quality Assurance Project Plan (ZS-QA-10)
QAPP Compliance Matrix

ZionSolutions QAPP SECTION 4.17	10CFR50 Appendix B CRITERIA XVII QUALITY ASSURANCE RECORDS	NQA-1-1994 BASIC REQUIREMENT 17 QUALITY ASSURANCE RECORDS	10CFR71 71.135 QUALITY ASSURANCE RECORDS	10 CFR72 72.174 QUALITY ASSURANCE RECORDS
The record system includes the retention of those design, fabrication, inspection, operation, and surveillance records essential to demonstrate product quality.	Sufficient records shall be maintained to furnish evidence of activities affecting quality.	Records that furnish documentary evidence of quality shall be specified, prepared, and maintained.	The licensee, certificate holder, and applicant for a CoC shall maintain sufficient written records to describe the activities affecting quality. The records must include the instructions, procedures, and drawings required by § 71.111 to prescribe quality assurance activities and must include closely related specifications such as required qualifications of personnel, procedures, and equipment.	The licensee, applicant for a license, certificate holder, and applicant for a CoC shall maintain sufficient records to furnish evidence of activities affecting quality. The records must include the following: design records, records of use, and the results of reviews, inspections, tests, audits, monitoring of work performance, and materials analyses. The records must include closely related data such as qualifications of personnel, procedures, and equipment.
For any work performed, the records to be generated must be identified, along with a means of matching the record to the item or activity to which it applies. Records must be legible, reproducible, and accurate.	Records shall be identifiable and retrievable.	Records shall be legible, identifiable, and retrievable.		Records must be identifiable and retrievable.
QA records shall be protected against damage, deterioration, unauthorized change, or loss.		Records shall be protected against damage, deterioration, or loss.		
The record system includes the retention of those design, fabrication, inspection, operation, and surveillance records essential to demonstrate product quality. It provides for the identification of materials and their corresponding	The records shall include at least the following: operating logs and the results of reviews, inspections, tests, audits, monitoring of work performance, and material analyses. Consistent with applicable regulatory requirements	Requirements and responsibilities for record transmittal, distribution, retention, maintenance, and disposition shall be established and documented.	The records must include the instructions or procedures which establish a records retention program that is consistent with applicable regulations and designates factors such as duration, location, and assigned responsibility.	

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
manufacturing, installation, inspection, test, and audit results. Requirements and responsibilities for the transmittal, distribution, retention, maintenance, and disposition of records are specified in approved procedures.	concerning record retention, such as duration, location, and assigned responsibility.		The licensee, certificate holder, and applicant for a CoC shall retain these records for 3 years beyond the date when the licensee, certificate holder, and applicant for a CoC last engage in the activity for which the quality assurance program was developed. If any portion of the written procedures or instructions is superseded, the licensee, certificate holder, and applicant for a CoC shall retain the superseded material for 3 years after it is superseded.	

Enclosure 3

Zion*Solutions* Quality Assurance Project Plan (ZS-QA-10)
QAPP Compliance Matrix

Zion*Solutions* QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
Section 4.2 Inspection and Test Personnel certification documentation shall be maintained in accordance with approved procedures. Section 4.5 Instructions, procedures, work instructions and drawings are prepared, reviewed, issued, and controlled in accordance with approved procedures. Section 4.9 Documentation of personnel, equipment, and process qualifications is maintained in accordance with procedures. Section 4.10 Inspection records contain, at a minimum, identification of the item inspected, date of inspection, inspector name, type of observation, acceptance and rejection criteria, results or acceptability, and reference to nonconformance's. Section 4.11 Records include as a minimum the item tested, date of test, name of the tester, environmental conditions, observations, acceptance and rejection criteria, results and acceptability, action taken for deviations noted, and name of the person evaluating results.	The records shall also include closely related data such as qualifications of personnel, procedures, and equipment. Inspection and test records shall, as a minimum, identify the inspector or data recorder, the type of observation, the results, the acceptability, and the action taken in connection with any deficiencies noted.			The records must include closely related data such as qualifications of personnel, procedures, and equipment. Inspection and test records must, at a minimum, identify the inspector or data recorder, the type of observation, the results, the acceptability, and the action taken in connection with any noted deficiencies.

Enclosure 3

ZionSolutions Quality Assurance Project Plan (ZS-QA-10)
QAPP Compliance Matrix

ZionSolutions QAPP	10CFR50 Appendix B	NQA-1 1994	10CFR71	10 CFR72
The record system includes the retention of those design, fabrication, inspection, operation, and surveillance records essential to demonstrate product quality. It provides for the identification of materials and their corresponding manufacturing, installation, inspection, test, and audit results. Requirements and responsibilities for the transmittal, distribution, retention, maintenance, and disposition of records are specified in approved procedures. Various regulatory agencies have requirements concerning records that are within the scope of the QAPP. The most stringent requirements shall be used in determining the final disposition.				Records pertaining to the design, fabrication, erection, testing, maintenance, and use of structures, systems, and components important to safety must be maintained by or under the control of the licensee or certificate holder until the NRC terminates the license or CoC.
SECTION 4.18	**CRITERIA XVIII AUDITS**	**BASIC REQUIREMENT 18 AUDITS**	**71.137 AUDITS**	**72.176 AUDITS**
Planned internal audits are scheduled annually and performed per approved procedures or checklists. Elements of the QAPP will be audited at least annually to provide comprehensive, independent verification and evaluation of all aspects of the quality assurance program and to determine its effectiveness.	A comprehensive system of planned and periodic audits shall be carried out to verify compliance with all aspects of the quality assurance program and to determine the effectiveness of the program.	Planned and scheduled audits shall be performed to verify compliance with all aspects of the quality assurance program and to determine its effectiveness.	The licensee shall carry out a comprehensive system of planned and periodic audits to verify compliance with all aspects of the quality assurance program and to determine the effectiveness of the program.	The licensee, applicant for a license, certificate holder, and applicant for a CoC shall carry out a comprehensive system of planned and periodic audits to verify compliance with all aspects of the quality assurance program and to determine the effectiveness of the program.

Enclosure 3

Zion*Solutions* Quality Assurance Project Plan (ZS-QA-10)
QAPP Compliance Matrix

Zion*Solutions* QAPP	10CFR50 Appendix B	NQA-1-1994	10CFR71	10 CFR72
Planned internal audits are scheduled annually and performed per approved procedures or checklists. An audit team, composed of one or more qualified auditors is identified for each audit using personnel who have no direct responsibility for the activity being covered. A lead auditor, as a member of the team, is designated as a team leader.	The audits shall be performed in accordance with written procedures or checklists by appropriately trained personnel not having direct responsibility in the areas being audited.	These audits shall be performed in accordance with written procedures or checklists by personnel who do not have direct responsibility for performing the activities being audited.	The audits must be performed in accordance with written procedures or checklists by appropriately trained personnel not having direct responsibility in the areas being audited.	The audits must be performed in accordance with written procedures or checklists by appropriately trained personnel not having direct responsibility in the areas being audited.
Audit reports are prepared upon completion of the audit and distributed to appropriate management for review and response. Management of the audited organizations provide a response to all identified conditions adverse to quality that includes corrective actions, including cause and action to prevent recurrence, and a schedule for completion, when applicable.	Audit results shall be documented and reviewed by management having responsibility in the area audited.	Audit results shall be documented and reported to and reviewed by responsible management.	Audit results must be documented and reviewed by management having responsibility in the area audited.	Audit results must be documented and reviewed by management having responsibility in the area audited.
The results of internal audits, surveillances and assessments and independent assessments and audits of Subcontractors will be utilized as input into the continuous improvement program through identification in the CR system. Re-audit of deficient areas will be performed when required.	Follow-up action, including reaudit of deficient areas, shall be taken where indicated.	Follow-up action shall be taken where indicated.	Follow-up action, including reaudit of deficient areas, must be taken where indicated.	Follow-up action, including reaudit of deficient areas, must be taken where indicated.

Enclosure 4: NQA-1 vs. Non-programmatic ANSI Standards Tables

1. ANSI N45.2.1-1973 vs NQA-1-1994, Subpart 2.1
2. ANSI N45.2.2-1972 vs NQA-1-1994, Subpart 2.2
3. ANSI N45.2.3-1973 vs NQA-1-1994, Subpart 2.3
4. ANSI N45.2.4-1972 vs NQA-1-1994, Subpart 2.4
5. ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5
6. ANSI N45.2.8-1975 vs NQA-1-1994, Subpart 2.8

Enclosure 4, Table 1
ANSI N45.2.1-1973 vs NQA-1-1994, Subpart 2.1

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
1. INTRODUCTION **1.1 Scope** This standard covers on-site cleaning of materials and components, cleanness control, and preoperational cleaning and layup of important nuclear power plant fluid systems during construction.	**1 GENERAL** Subpart 2.1 provides amplified requirements for the management of cleaning and cleanness control of fluid systems and associated components for nuclear power plants during manufacturing, construction, repairs, and modifications. It supplements the requirements of Part I.	N45.2.1 limited to "during construction." NQA-1 larger scope of "during manufacturing, construction, repairs, and modifications."
These systems include those whose satisfactory performance is required for safe and reliable operation of the plant.		QAPP establishes applicability in Section 1.2, Scope
The requirements may also be extended to other parts of nuclear power plants when specified in contract documents.	...when and to the extent specified by the organization invoking Subpart 2.1.	In addition, the QAPP establishes applicability in Section 1.2, Scope
The standard covers requirements necessary to ensure an adequately clean system upon completion of construction activities, and covers the period from which the materials and equipment are removed from storage or receiving for installation at the construction site until the systems are ready for pre-operational testing.		Guidance only. Wording does not establish requirements.
The intent of this standard is to require close attention to cleanness control during erection of a nuclear power plant so that only water flushing or rinsing of an installed system is required to render it ready for service.		Guidance only. Wording does not establish requirements.
When more than a water flush or rinse is needed to produce the specified cleanness, additional cleaning, in accordance with this standard may be necessary.		Guidance only. Wording does not establish requirements.
This standard is intended to be used in conjunction with ANSI N45.2 Quality Assurance Requirements for Nuclear Power Plants.	...and shall be used in conjunction with applicable Basic and Supplementary Sections of Part I when and to the extent specified by the organization invoking Subpart 2.1.	Guidance only. Wording does not establish requirements.
1.2 Applicability The requirements of this standard apply to the work of any individual or organization that participates in the construction phase cleaning of items to be incorporated into nuclear power plants as discussed in Subsection 1.1.	**Section 1 "Introduction"** **2 Applicability** The requirements of this Part (Part II) apply to fabrication, construction, modification, repair, maintenance, and testing activities that affect the quality of structures, systems, and components for nuclear facilities. These activities include the performing function of attaining quality objectives and verifying that activities affecting quality have been correctly performed. These activities include planning, subsurface investigation, fabricating, handling, shipping, storing, cleaning...	These words are not included in NQA-1 Subpart 2.1, but rather in Section 1
The extent to which the individual requirements of this standard will apply will depend upon the nature and scope	...when and to the extent specified by the organization invoking Subpart 2.1.	OK

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
of work to be performed and the importance of the item or service involved.		
The requirements are intended to ensure that only proper cleaning materials, equipment, processes and procedures are utilized during the construction of power plants and that the quality of items is maintained as a result of use of proper cleaning practices and techniques during construction.	**Section 1 "Introduction"** **2 Applicability** The requirements of this Part (Part II) apply to fabrication, construction, modification, repair, maintenance, and testing activities that affect the quality of structures, systems, and components for nuclear facilities. These activities include the performing function of attaining quality objectives and verifying that activities affecting quality have been correctly performed. These activities include planning, subsurface investigation, fabricating, handling, shipping, storing, cleaning.	These words are not included in NQA-1 Subpart 2.1, but rather in the Introduction to Part II
1.3 Responsibility The organization or organizations responsible for the activities covered by this standard shall be identified and the scope of their responsibility shall be documented.	**Section 1 "Introduction"** **3 Responsibility** The organization invoking this Part (Part II) shall be responsible for specifying which section, or portions thereof, apply and appropriately relating them to specific items and services. To the extent necessary, this organization shall invoke the applicable provision of Part 1, Basic and Supplementary Requirements, to specify a complete Quality Assurance Program appropriate for the specific items or services. The organization upon which this Part (Part II), or portions thereof, is invoked shall be responsible for complying with the specified requirements.	These words are not included in NQA-1 Subpart 2.1, but rather in the Introduction to Part II
Such responsibility should be assigned at the earliest practical point in time so as to facilitate incorporation of cleaning requirements in design drawings and purchase specifications.		QAPP Section 2, Quality Responsibilities establishes responsibilities. Otherwise wording is guidance.
The establishment of practices and procedures and provision of resources, in terms of personnel, equipment, and services necessary to implement the requirements of this standard, may be delegated to other organizations and such delegations shall also be documented.		QAPP Section 2, Quality Responsibilities covers delegation.
Each organization participating in site construction activities shall comply with procedures and instructions issued for the project and with those requirements of this standard applicable to his work.	**Section 1 "Introduction"** **3 Responsibility** The organization invoking this Part (Part II) shall be responsible for specifying which section, or portions thereof, apply and appropriately relating them to specific items and services. To the extent necessary,	These words are not included in NQA-1 Subpart 2.1, but rather in the Introduction to Part II

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	this organization shall invoke the applicable provision of Part 1, Basic and Supplementary Requirements, to specify a complete Quality Assurance Program appropriate for the specific items or services. The organization upon which this Part (Part II), or portions thereof, is invoked shall be responsible for complying with the specified requirements.	
The organization responsible for performing the cleaning shall identify and document detailed cleaning procedures unless they are specified in the procurement documents.	**Section 1 "Introduction** **4.2 Procedures** Installation, inspection, test procedures, and work instructions identified during planning shall be prepared.	These words are not included in NQA-1 Subpart 2.1, but rather in the Introduction to Part II. Not as specific in NQA-1.
Requirements for review and/or approval of such procedures shall be specified in the procurement documents.	**NQA-4S-1 "Supplementary Requirements for Procurement Document Control"** **Section 2.5** The procurement documents at all tiers shall identify the documentation required to be submitted for information, review, or approval by the Purchaser.	OK
1.4 Definitions The following, definitions are provided to assure a uniform understanding of select terms as they are used in this standard.	**1.1 Definitions** The following definitions are provided to assure a uniform understanding of unique terms as they are used in Subpart 2.1.	OK
Acid Cleaning—The removal of metal oxides by either dissolution of the oxide or undercutting the oxide by dissolution of the base metal with an acid solution.	*acid cleaning* — the removal of metal oxides by either dissolution of the oxide or undercutting the oxide by dissolution of the base metal with an acid solution	OK
Alkaline Cleaning—The removal of organic contaminants by converting them to an emulsion with an alkaline solution such as trisodium phosphate.	*alkaline cleaning* — the removal of organic contaminants by converting them to an emulsion with an alkaline solution such as trisodium phosphate	OK
Chelate Cleaning—The removal of slightly soluble compounds such as iron oxide, by complexing the metallic ions with organic chelating compounds such as ethylene diamine tetra-acetic acid (EDTA).	*chelate cleaning* — the removal of slightly soluble compounds such as iron oxide, by complexing the metallic ions with organic chelating compounds such as ethylene diamine tetra-acetic acid (EDTA)	OK
Chemical Conditioning—The addition of chemicals in low concentration to flush, rinse, or layup water to prevent precipitation of dissolved solids, inhibit corrosion, etc.	*chemical conditioning* — the addition of chemicals in low concentration to flush, rinse, or lay up water to inhibit precipitation of dissolved solids, corrosion, and other detrimental effects	OK
Cleaning—The removal of any contaminants that might have a deleterious effect on plant safety and reliable operation.	*cleaning* — the removal of any contaminants that might have *a* deleterious effect on operation of the plant	Definitions are similar and have same intent- N45.2.1 includes the words "on plant safety" and "reliable"
Contractor—Any individual or organization entering into a contract to furnish items or services to a purchaser. The term contractor includes the terms Vendor, Supplier,	**Section 1 "Introduction"** Supplier - any individual or organization who furnishes items or services in accordance with a	This definition not included in NQA-1 Subpart 2.1, but rather in Section 1

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
and Subcontractor or sub-tier levels of these where appropriate.	procurement document. An all inclusive term used in place of the following: vendor, seller, contractor, subcontractor, fabricator, consultant, and their subtier levels.	
Contamination—Any undesirable foreign material on the surface of an item, in the atmosphere, or in process liquids or gases.	*contamination* — any unwanted or undesirable foreign material on the surface of an item, in the atmo-sphere, or in process liquids or gases	OK
Corrosion Resistant Alloys— Materials, such as stainless steel, nickel-base, or cobalt-base alloys, that inherently resist oxidation or chemical attack in water, air, and the operating environment.	*corrosion-resistant alloys* — materials that inherently resist oxidation or chemical attack in water, air, and the operating environment, such as stainless steel, nickel-base alloys, or cobalt-base alloys	OK
Crevice—Any narrow opening in a surface or any open juncture between mating surfaces in which solutions can be trapped and not readily removed during rinsing or flushing operations; for example, the annular spaces in threaded connections and socket assemblies, tube-to-tube sheet joints, and tube-to-tube support joints.	*crevice* — a narrow opening in a surface or an open juncture between mating surfaces in which solutions or contaminants can be trapped and not readily removed during rinsing or flushing operations (for example, the annular spaces in threaded connections and socket assemblies, tube-to-tube sheet joints, and tube-to-tube support	OK
Dead Leg--Any area that does not have flow during the cleaning operation or which cannot be drained without special provisions.	*dead leg* — an area that does not have flow during the cleaning operation or that cannot be drained without special provisions	OK
Documentation—Any written or pictorial information describing, defining, specifying, reporting, or certifying activities, requirements, procedures or results.	**Section 1 "Introduction"** document - any written or pictorial information describing, defining, specifying, reporting, or certifying activities, requirements, procedures, or results..."	This definition not included in NQA-1 Subpart 2.1, but rather in Section 1
	fluid — any gas or liquid	This definition not included in N45.2.1
Flushing—Flowing water through a component or system at adequate velocity to suspend and carry away anticipated contaminants.	*flushing* — flowing fluid through a component or system at adequate velocity to suspend and carry away anticipated contaminants	OK
Inhibitor—A chemical additive which retards some specific chemical reaction.	*inhibitor* — a chemical additive that retards some specific chemical reaction	OK
Inaccessible Area—An area or opening in an item which is not directly accessible for cleaning or inspection.	*inaccessible area* — an area or opening in an item that is not directly accessible for cleaning or inspection	OK
Item —Any level of unit assembly, including structure, system, subsystem, subassembly, component, part or material.	**Section 1 "Introduction"** item - an all inclusive term used in place of any of the following: appurtenance, assembly, component, equipment, material, module, part, structure, subassembly, subsystem, system, or unit.	This definition not included in NQA-1 Subpart 2.1, but rather in Section 1
Layup—The protection of an item after it has been cleaned, to prevent corrosion of interior surfaces while the item is out of service or awaiting subsequent operations.	*layup* — the protection of an item after it has been cleaned to prevent corrosion of interior surfaces while the item is out of service or awaiting subsequent operations	OK
Mechanical Cleaning—A method in which contaminant removal is accomplished solely by mechanical means, including wiping, abrasive blasting, brushing, grinding, sanding, chipping, etc.	*mechanical cleaning* — a method in which contaminant removal is accomplished solely by mechanical means, including wiping, abrasive blasting, high pressure water jetting, brushing, sanding, grinding, and	OK

Enclosure 4, Table 1
ANSI N45.2.1-1973 vs NQA-1-1994, Subpart 2.1

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	chipping	
Pitting— Localized corrosion resulting in surface defects.	*pitting* — surface defects resulting from localized corrosion	OK
Purchaser—The agency responsible for issuance administration of a contract, subcontract, or purchase order imposing this standard or portions hereof.	**Section 1 "Introduction"** Purchaser—The organization responsible for establishment of procurement requirements and for issuance or administration, or both, of procurement documents	This definition not included in NQA-1 Subpart 2.1, but rather in Section 1
Rinsing—(I) Filling and draining an item with water until contaminants in the effluent water are reduced to some predetermined concentration, or (2) flowing water through the system or component at low velocity until contaminants in the effluent water are reduced to some predetermined concentration.	*rinsing* (a) filling and draining an item with water until soluble contaminants in the effluent water are reduced to some predetermined concentration; or (b) flowing water through the system or component until water soluble contaminants in the effluent water are reduced to some predetermined concentration	OK
Rust--Corrosion products, consisting largely of iron oxide. Such oxides may vary in color from red to black and may form a loosely adherent heavy covering to a tightly adherent light film. Pitting or general surface roughening may or may not be present.	*rust* — corrosion products consisting largely of iron oxide. Such oxides may vary in color from red to black and may form anything from a loosely adherent heavy covering to a tightly adherent light film. Pitting or general surface roughening may or may not be present.	OK
Sensitized Corrosion Resistant Alloy — Any alloy which has been subjected to heating that causes inter-granular precipitation of chromium carbides in quantities sufficient to be detected by methods of ASTM A262-68, Recommended Practices for Detecting Susceptibility to Intergranular Attack in Stainless Steel or ASTM A393-63, Recommended Practices for Conducting Acidified Copper Sulfate Test for Inter-granular Attack in Austentic Stainless Steel.	*sensitized corrosion-resistant alloy* — a corrosion-resistant alloy that has been subjected to heating that causes intergranular precipitation of chromium car-bides in sufficient quantities to be detected by Practice B, C, D, F, or F of ASTM A 262, Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels	ANSI N45.2.1 includes ASTM A393. NQA-1 refers to the latest document A262.
Solvent Cleaning— Dissolving organic contaminants with an organic solvent.	*solvent cleaning.*— removing contaminants with an organic solvent	OK
1.5 Referenced Documents Other documents that are required to be included as part of this standard are either identified at the point of reference or described in Section 10 of this standard. The issue or edition of the referenced document that is required will be specified either at the point of reference or in Section 10 of this standard.	**Section 1 "Introduction** **7 Referenced Codes, Standards, and Specifications** All codes, standards, and specifications that are referenced as a part of this Part (Part II) are listed in the Table entitled "Codes, Standards, and Specifications Referenced in Text." Codes, standards, and specifications referenced in this Part (Part II) may be identified with the applicable date or reference at the point of reference or in the Table "Codes, Standards, and Specifications Referenced in Text.	These words are not included in NQA-1 Subpart 2.1, but rather in the Introduction to Part II.
Other terms and definitions are contained in ANSI N45.2.10		N45.2.10 incorporated into NQA-1.
2. GENERAL REQUIREMENTS This section contains requirements	**2 GENERAL REQUIREMENTS**	ZS retains responsibility for work. Delegation is covered in QAPP Section 2, Quality Responsibilities"

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
that are to be fulfilled by the contractor who is responsible for performing any segment of work described in paragraphs 3 through 9 of this standard.		and use of contractors is covered in Sections 4.7.6 Vendor Evaluation.
Cleanness classification for an item shall be specified in accordance with paragraph 3.1 of this standard.	The cleanness classification of each item shall be specified in accordance with para. 3.2 of Subpart 2.1.	OK
The work and quality assurance requirements for the cleaning of items and systems to be incorporated in the nuclear power plant and control of cleanness thereof shall be established in order to	The work and quality assurance requirements for the cleaning of components and systems and for the control of their cleanness shall be established in order to:	OK
(1) ensure the removal of any deleterious contaminants,	*(a)* ensure the removal of deleterious contaminants;	OK
(2) minimize recontamination of cleaned surfaces, and	*(b)* minimize recontamination of cleaned surfaces; and	OK
(3) minimize the cleaning required after installation.	(c) minimize the cleaning required after installation, repair, or modification.	OK
2.1 Planning The cleanness and cleanness control activities shall be planned and outlined to define cleaning and inspection operations to be used.	**2.1 Planning** Cleaning and cleanness control activities for each phase (manufacturing, construction, modification, repair, etc.) shall be planned in accordance with the requirements of the Introduction to this Part (Part II).	NQA-1 adds the words (manufacturing, construction, modification, repair, etc.)
It shall detail the systematic, sequential progression of cleaning operations for each item or system, the responsibilities of parties concerned for each operation, and measures to be employed to preserve the cleanness of cleaned surfaces.	The plan(s) shall define the cleaning and inspection operations to be used, the system, the responsibilities of the parties concerned for each operation, and the measures to be employed to preserve the cleanness of cleaned surfaces.	N45.2.1 uses the words "systematic, sequential progression". This is unnecessary detail not included in NQA-1.
Planning for cleaning activities shall include a review of the system and component design specifications and drawings and of the construction work plans and schedules to ensure that provisions for cleaning have been incorporated; that they can be accomplished as specified; and that time and resources are sufficient to accomplish the required actions.	**Section 1 Introduction** **4.1 Planning** Planning shall include a review of the structure, system or component design/procurement specifications, materials, lists, drawings, construction work plans, and schedules to ensure that fabrication, installation, modification, inspection, testing, etc., activities have been incorporated; that the work can be accomplished as specified; and that time and resources, plus training, are sufficient to accomplish the work in accordance with specified requirements	These words are not included in NQA-1 Subpart 2.1, but rather in the Introduction to Part II
This review shall consider the following items as appropriate.	In addition, planning shall consider the following factors, as appropriate, recognizing that this list may not be complete nor applicable to each phase covered by this Part (Part II):	NQA-1 adds the words "recognizing that this list may not be complete nor applicable to each phase covered by this Part (Part II):"
1. Adequacy of vents and drains, inspection access points, bypass or recirculation lines;	*(a)* adequacy of vents, drains, inspection access points, and bypass or recirculation lines;	OK
2. Facilities for filters, and flushing and/or drain connections, in	*(b)* facilities for filters and flushing and drain connections in locations	OK

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
locations where dead legs are unavoidable;	where dead legs are unavoidable;	
3. Piping system design-and installation in a manner which minimizes the necessity for installation of temporary piping during the cleaning operations; (Where possible, divide the system into a number of separate cleaning circuits to facilitate cleaning).	(c) design and installation of piping in a manner that minimizes the necessity for installing temporary piping during the cleaning operations, such as dividing the system into a number of separate cleaning circuits to facilitate cleanability;	OK
4. Sequencing of the installation operations to provide for visual inspection (crawl through) of the inside surfaces of large diameter piping;	*(d)* sequencing of installation operations to provide for visual inspection of inside surfaces of large diameter piping;	N45.2.1 uses the words "crawl through". This is unnecessary detail not included in NQA-1.
5. Control of the installation operations so that piping and components which have already been installed are not subject to contamination when subsequent installation operations are performed;	(e) control of installation operations so that piping and components that have already been installed are not subject to contamination when subsequent installation operations are performed;	OK
6. Adequate pumping and heating capacities when these are important factors in the cleaning operations.	*(f)* adequacy of pumping and heating capacities when these are important factors in the cleaning operations;	OK
	(g) disposal of cleaning solutions and waste water;	These words not included in N45.2.1
	(h) safety, fire protection, and other hazards.	These words not included in N45.2.1
2.2 Procedures and Instructions Cleaning procedures as well as procedures or work instructions for cleanness control practices and inspections, examinations or tests to verify cleanness of items shall be prepared.	**2.2 Procedures and Instructions** Written procedures and instructions for cleaning, cleanness control, inspections, and tests to verify cleanness of items shall be prepared in accordance with the requirements of the Introduction to this Part (Part II).	N45.2.1 includes the word "examinations"
These documents shall include as appropriate:	**Section 1 "Introduction** **4.2 Procedures** The documents shall include the following as applicable:	These words are not included in NQA-1 Subpart 2.1, but rather in the Introduction to Part II – In addition 2 through 11 are also in this Part.
1. Detailed cleaning—cleanness control procedures	**2.2 Procedures and Instructions** Written procedures and instructions for cleaning, cleanness control, inspections, and tests to verify cleanness of items shall be prepared in accordance with the requirements of the Introduction to this Part (Part II).	OK
2. Personnel safety considerations	(a) personnel safety and structure of facility protection considerations	OK
3. Structure or facility protection consideration	(a) personnel safety and structure of facility protection considerations	OK
4. Inspection and test equipment requirements	(h) identification of inspection and test equipment and related calibration requirements including recalibration dates	NQA-1 adds the words "and related calibration requirements including recalibration dates"
5. Sequence of work activities, inspections and tests	(d) sequence of activities to be followed and steps within a given	OK

Enclosure 4, Table 1
ANSI N45.2.1-1973 vs NQA-1-1994, Subpart 2.1

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	activity (i) sequence and frequency of inspection or test	
6. Sequential steps for a given activity	(d) sequence of activities to be followed and steps within a given activity	OK
7. Acceptance criteria including methods for verifying cleanness	(j) acceptance criteria and methods for verifying	OK
8. Preparatory checks	(e) prerequisites including preparatory checks and inspections	OK
9. Approvals	(l) approvals and authorizing or verifying signatures	OK
10. Responsibilities	(k) responsibility and required qualifications of personnel	OK
11. Data report forms	(n) data or test report forms	NQA-1 also adds "or test"
The preparation of the actual working procedures or instructions to be used should consider:	**2.2.2** Preparation of the actual cleaning procedures or instructions shall consider the following:	N45.2.1 uses "should", NQA-1 uses "shall"
1. Work practices, housekeeping, access control, and prevention of contamination and recontamination;	*(a)* work practices, housekeeping, access control, and prevention of contamination and recontamination;	OK
2. Effectiveness of cleaning procedures for removal of the contaminants;	(b) effectiveness of cleaning methods for removal of the contaminants;	OK
	(c) effects of residual quantities of cutting fluids, liquid penetrants, weld fluxes, precleaning solutions, engineering test fluids, and other process compounds that may have been intentionally or advertently applied to the surface of the item during prior steps of manufacture, installation, or use;	These words not included in N45.2.1
3. Corrosiveness of cleaning solutions in contact with the material of an item, particularly in the case of dissimilar metals;	*(d)* corrosiveness of cleaning solutions in contact with the material of an item, particularly in the case of dissimilar metals and entrapment of cleaning solutions;	NQA-1 adds the words "and entrapment of cleaning solutions"
4. Chemical composition, concentration, and temperature limits of cleaning solutions to avoid deleterious effects;	(e) chemical composition, concentration, and temperature limits of cleaning solutions to avoid deleterious effects;	OK
5. Proposed solution and metal temperatures, solution concentrations, velocity, and contact times during cleaning;-	*(f)* solution and metal temperatures, solution concentrations, velocity, and contact times during cleaning;	OK
6. Methods for monitoring cleaning solution concentration and temperatures during cleaning operations;	(g) methods for monitoring cleaning solution concentration, temperatures, and velocities during cleaning operations;	OK
7. Identification of the systems and subsystems with which the procedures are to be used;	*(h)* identification of the items for which the procedures are to be used;	OK
8. Proposed sequence of operations and methods of filling, system circulation, draining, and flushing;	*(i)* sequence of operations and methods of filling system circulation, draining, and flushing;	OK
9. Proposed equipment isolation, location of temporary piping and valves, location of strainers and where possible, the location of temporary equipment;	*(j)(1)* equipment isolation (2) location of: *(a)* temporary piping and valves *(b)* strainers (c) temporary equipment *(d)* connections for filling, flushing, rinsing, and draining equipment	NQA-1 adds: *(d)* connections for filling, flushing, rinsing, and draining equipment
10. Construction operations prohibited during cleaning operations;	*(k)* activities to be prohibited or constrained before, during, and after	OK

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	cleaning operations;	
11. Methods for rinsing and neutralizing including number of rinses;	*(l)* methods for rinsing and neutralizing, including estimated number of rinses;	NQA-1 adds the word "estimated"
12. Methods for verifying cleanness;	*(m)* methods for verifying cleanness;	OK
13. Methods of drying and layup of the system;	*(n)* methods for drying and layup;	OK
14. Methods for protecting installed equipment which are not used in the cleaning operations;	(o) methods for protecting installed items which are not involved in the cleaning operation;	N45.2.1 states "used", NQA-1 states "involved"
15. Methods for disposal of cleaning solutions;	(p) method of disposal of cleaning solution.	OK
2.3 Results Inspection and test results shall be documented in a suitable test report or data sheet.	**BR 10 "Inspection"** Inspection results shall be documented. **BR 11 "Test Control"** Test results shall be documented..."	NQA-1 does not include words "in a suitable test report or data sheet".
Each report shall identify the item to which it applies, the procedures or instruction followed in performing the task and the identification of the following:	**Supplement 10S-1 "Supplementary Requirements for Inspection"** **Paragraph 9** Records shall, as a minimum, identify (a) through (f) below:	Supplement 11S-1 contains similar words to 10S-1. NQA-1 does not include words "the procedures or instruction followed in performing the task".
(1) Conditions encountered which were not anticipated, including nonconformance.	(f) reference to information on action taken in connection with nonconformances	Slightly different words, but same intent.
(2) Identity of inspector or tester.	(c) inspector	OK
(3) Completion date.	(b) date of inspection	Slightly different words, but same intent.
Test reports and data sheets shall include an evaluation of the acceptability of inspection and test results and provide for identifying the individual who performed the evaluation.	(e) results or acceptability and **11S-1 "Supplementary Requirements for Test Control"** **Paragraph 5(g)** person evaluating test results	Slightly different words, but same intent.
2.4 Personnel Qualifications Those personnel who perform inspection, examination or testing activities required by this standard shall be qualified in accordance with *N45.2.6* Qualifications of Inspection, Examination, and Testing Personnel for the Construction Phase of Nuclear Power Plants.	**Introduction** **Section 5 "Qualification of Personnel"** Inspection, test, and nondestructive examination personnel and laboratory technicians shall be trained and qualified/certified in accordance with the applicable portions of Part 1, Basic and Supplementary Requirements. Professional personnel shall meet the requirements defined by the *implementing organization in its* position descriptions.	These words are not included in NQA-1 Subpart 2.1, but rather in the Introduction to Part II. N45.2.1 requires qualification in accordance with N45.2.6, NQA-1 requires qualification in accordance with NQA-1.
2.5 Test Equipment **2.5.1 Selection.** Inspection and test equipment used to implement the requirements of this standard shall be selected to have sufficient accuracy and sensitivity	**Supplement 12S-1 "Supplementary Requirements for Control of Measuring and Test Equipment"** **Paragraph 2** Selection of measuring and test equipment shall be controlled to	Slightly different words, but same intent.

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
tolerance to determine conformance to specified requirements.	assure that such items are of proper type, range, accuracy, and tolerance to accomplish the function of determining conformance to specified requirements.	
2.5.2 Calibration and Control. Test equipment shall be adjusted and calibrated at prescribed intervals against certified equipment having known valid relationships to nationally known standards.	**Supplement 12S-1 "Supplementary Requirements for Control of Measuring and Test Equipment"** **Paragraph 3.1** "Measuring and test equipment shall be calibrated, adjusted and maintained at prescribed intervals or, prior to use, against certified equipment having known valid relationships to nationally recognized standards.	Slightly different words, but same intent.
If no national standards exist, the basis of calibration shall be documented.	**Supplement 12S-1 "Supplementary Requirements for Control of Measuring and Test Equipment"** **Paragraph 3.1** If no national recognized standards exists, the bases for calibration shall be documented.	OK
Records' shall be maintained and equipment suitably marked to indicate calibration status.	**Supplement 12S-1 "Supplementary Requirements for Control of Measuring and Test Equipment"** **Paragraph 5** Records shall be maintained and equipment shall be suitably marked to indicate calibration status.	OK
When inspection and testing equipment is found to be out of calibration, an evaluation shall be made of the validity of previous inspection or test results and acceptability of items previously inspected or tested.	**Supplement 12S-1 "Supplementary Requirements for Control of Measuring and Test Equipment"** **Paragraph 3.2** When measuring and test equipment is found to be out of calibration, an evaluation shall be made and documented of the validity of previous inspection or test results and of the acceptability of items previously inspected or tested.	NQA-1 adds the words "and documented"
2.6 Housekeeping In areas, facilities and environments where the cleanness controls of this standard are required, the housekeeping requirements shall be in accordance with ANSI N45.2.3, Housekeeping During Construction Phase of Nuclear Power Plants.		QAPP Section 4.13, Handling, Storage, and Shipping and Subpart 2.3 "Quality Assurance Requirements for Housekeeping for Nuclear Power Plants" establish requirements for housekeeping.
	2.3 Rectification of Unacceptable Cleanness If indications of contamination in excess of specified limits are observed at the end of a cleaning operation or at any subsequent inspections for cleanness, the item	These words not included in N45.2.1

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	shall be recleaned using an approved procedure. If such indications are observed at the anticipated end of a cleaning operation, continued cleaning shall be performed to reduce the level to the specified limit. If necessary, an evaluation shall be made to determine the cause of the unacceptable cleanness and the actions required to preclude recurrence.	
3. CRITERIA FOR CLEANING It is intended that systems that have been cleaned in accordance with this standard should require only water flushing or rinsing as a final cleaning step in preparing them for service.	**3 CLEANNESS CRITERIA**	Guidance only. Wording does not establish requirements.
However, where more than normal water flushing or rinsing is required to produce the specified cleanness, additional cleaning in accordance with this standard may be necessary.		Guidance only. Wording does not establish requirements.
While this standard is primarily concerned with the cleaning and cleanness of internal surfaces, external surface cleanness may be of equal importance in some cases and should be recognized during the cleaning operations.		Guidance only. Wording does not establish requirements.
Internal and external surfaces may have different cleaning and cleanness requirements.	**3.1** Different cleanness classes may be assigned to internal and external surfaces, or to different parts of the same item based on the cleanness needs of the specific item.	OK
3.1 Cleanness Classifications The degree of cleanness required is a function of the particular item under consideration.	**3.1 Cleanness Classification** The level of cleanness required for any particular application is a function of the particular item under Consideration.	N45.2.1 uses word "degree", NQA-1 uses "level" – these are equivilent.
The assignment of a cleanness classification shall consider the susceptibility to corrosion of the material, the consequences of malfunction or failure of the item and the probability of contaminants contributing to or causing such malfunction or failure.	The assignment of a cleanness classification shall consider the following: (a) the function of the item to be cleaned; *(b)* the susceptibility of its materials of construction to various forms of corrosion, including intergranular cracking, or stress corrosion cracking under fabrication, installation, or operating conditions; (c) the consequences of malfunction or failure of the item; *(d)* the possibility of contaminants (introduced during fabrication, storage, installation, repairs, or service) contributing to or causing such malfunction or failure.	N45.2.1 does not reference "the function of the item to be cleaned." NQA-1 adds words "various forms of corrosion, including intergranular cracking, or stress corrosion cracking under fabrication, installation, or operating conditions" and "(introduced during fabrication, storage, installation, repairs, or service)".
This standard does not establish the cleanness classification of any specific item. However, typical examples are presented as a guide.		Guidance only. Wording does not establish requirements.
The specification for the required cleanness class shall be the		QAPP Section 4.13, Handling, Storing, and Shipping establishes requirements

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
responsibility of the purchaser.		in this area.
The class of cleanness required for any given application shall be specified in design drawings or specifications associated with the cleaning of items, and the method of verification of cleanness shall be documented.	The cleanness class or classes applicable to the item or specific parts of the item shall be established and specified in the applicable drawings, specifications, or other appropriate documents. and (Preparation of the actual cleaning procedures or instructions shall consider the following): **2.2(m)** methods for verifying cleanness	N45.2.1 states "required for any given application" whereas NQA-1 states "applicable to the item or specific parts of the item"
	Four classes of surface cleanness (Classes A, B, C, and D) with criteria for each are provided in Subpart 2.1. Guidelines for assigning cleanness classifications are listed in Part III, Subpart 3.2, Appendix 2.1.	These words not included in N45.2.1
NOTE The following cleanness classifications are not directly related to component classifications assigned by the ASME Boiler and Pressure Vessel Code for design and inspection or for other purposes.		Guidance only. Wording does not establish requirements.
3.1.1 Class A—A very high level of cleanness in which there is no evidence of contamination of a surface either under visual examination, with or without magnification, or with the aid of sensitive detection methods.	**3.2 Cleanness Class Criteria** **3.2.1 Class A**. A very high level of cleanness as evidenced by the freedom from all types of surface contamination, according to the acceptance criteria of the inspection methods specified in the procedures required by para. 2.2.1. If close control of particulate contamination is required, a clean room, in accordance with para. 8.5.5 of ASTM A 380-78, Practice for Cleaning and Descaling Stainless Steel Parts, Equipment, and Systems, shall be employed during the manufacturing, assembly, and installation operations when particulate contamination could occur. Gross and precision inspection methods applicable to Class A are described in paras. 7.2 and 7.3 of ASTM A 380-78; other special tests shall be specified as necessary. Where the cleanness of internal surfaces is evaluated by flushing, criteria shall be specified in the cleaning procedure.	NQA-1 includes more detail in referencing ASTM A380.
Class A cleanness applies to special items such as fuel elements, control rod drive mechanisms, delicate instruments, and other close tolerances or carefully controlled surfaces or assemblies.		Guidance only. Wording does not establish requirements.
Such items should receive, their		Guidance only. Wording does not

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
required level of cleanness at the point of manufacture and cleanness must be maintained at the construction site.		establish requirements.
For these reasons, requirements of this level of cleanness are considered to be outside of the scope of this document.		Guidance only. Wording does not establish requirements.
3.1.2 Class B—A high level of cleanness applicable to reactor coolant systems, components, and other items, such as the reactor coolant purification system, which have similar cleanness requirements.	**3.2.2 Class B** – A high level of cleanness as evidenced by the following characteristics	NQA-1 does not include the examples given in N45.2.1.
Piping and components in systems which are designed as requiring Class B cleanness shall meet the following requirements:	**3.2.2 Class B**. A high level of cleanness as evidenced by the following characteristics.	NQA-1 does not include the words "piping and component in systems"
1. The surface shall appear "metal clean" when examined without magnification under a lighting level (background plus supplementary lighting) of at least 100 foot candles. Scattered areas of rust are permissible provided the aggregate area of rust does not exceed 2 square inches in any one square foot area.	***(a) Corrosion-Resistant Alloys*** *(1)* The surface shall appear metal clean and free of organic films and contaminants when examined in accordance with para. 7.2.1 of ASTM A 380-78, Practice for Cleaning and Descaling Stainless Steel Parts, Equipment, and Systems, except light deposits of atmospheric dust are permissible and shall show no evidence of deleterious contamination when subjected to the wipe test of para. 7.2.2 of ASTM A 380-78. Scattered areas of rust are permissible, provided the aggregate area does not exceed 2 sq in. in any 1 sq ft area (14 cm^2 per 1000 cm^2). Temper films and discolorations resulting from welding are acceptable. ***(b) Carbon and Low Alloy Steels*** *(1)* The surface shall appear metal clean when examined in accordance with para. 7.2.1 of ASTM A 380-78, except light deposits of atmospheric dust are permissible, and shall show no deleterious contamination when subjected to the wipe test of para. 7.2.2 of ASTM A 380-78. Wipe tests shall be made prior to the application of any preservative film (some type of protective film may be required in order to maintain a clean carbon or low alloy steel surface at Class 8 level). Scattered areas of rust are permissible, provided the aggregate area does not exceed 2 sq in. in any 1 sq ft area (14 cm^2 per 1000 cm^2).	NQA-1 includes more detail in referencing ASTM A380.
NOTE Localized rusting may indicate pitting of the surface and should be evaluated metallurgically). Thin temper films resulting from welding or post-weld		Guidance only. Wording does not establish requirements.

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
heat treatment are acceptable.		
2. The surface shall be free or particulate contaminants such as sand, metal chips, weld slag, etc.	***(a) Corrosion-Resistant Alloys*** *(1)* The surface shall appear metal clean *(b) Carbon and Low Alloy Steels* *(1)* The surface shall appear metal clean	Different words but same intent on cleanness.
3. The surface shall be free of organic films and contaminants such as oils, paint, and preservatives as determined by a visual examination or an organic solvent-dampened white cloth or an equivalent alternate method.	***(a) Corrosion-Resistant Alloys*** *(1)* The surface shall appear metal clean and free of organic films and contaminants when examined in accordance with para. 7.2.1 of ASTM A 380-78, Practice for Cleaning and Descaling Stainless Steel Parts, Equipment, and Systems ***(b) Carbon and Low Alloy Steels*** *(1)* The surface shall appear metal clean when examined in accordance with para. 7.2.1 of ASTM A 380-78,	N45.2.1 provides examples otherwise same.
4. When a visual inspection is not possible and the surfaces are accessible, a dry white-cloth wipe, followed by a solvent-dampened white-cloth wipe, may be used to evaluate the cleanness of the surface.	**3.2.2(a).** When visual inspection is impossible but surfaces are accessible for wipe tests, sufficient wipe tests in different areas of the item shall be made to evaluate the general cleanness level of the surface. **3.2.2(b).** When visual inspection is impossible, but surfaces are accessible for a wipe test, sufficient wipes of different areas of the item shall be made to evaluate the general cleanness of the surface.	Wording between N45.2.1 and NQA-1 is somewhat different. Detail method information in N45.2.1 covered by specific NQA-1 reference to ASTM 380-78 Paragraph 7.2.2.
If either cloth exhibits indications of contamination, the system shall either be recleaned or the specific contaminant shall be determined and evaluated as to its potential deleterious effect.	**2.3** If indications of contaminations in excess of specified limits are observed at the end of a cleaning operation or at any subsequent inspections for cleanness, the item shall be recleaned using an approved procedure.	N45.2.1 also allows for determination and evaluation.
5. If flushing is the only practical means for determining system cleanliness, the system shall be evaluated by examining a 20-mesh (ASTM E11 1-70, Specifications for Wire Cloth Sieves for Testing Purposes) or finer filter, or the equivalent, installed on the outlet of the cleaning circuit.	***(a) Corrosion-Resistant Alloys*** *(2)* If flushing is the only practical means for evaluating the cleanness of internal surfaces, a 20-mesh (850 *m*m, ASTM E 11, Specification for Wire Filter Cloth Sieves for Testing Purposes) or finer filter (or the equivalent) shall be installed and the item flushed with water or other fluid meeting the requirements of para. 3.4. ***(b) Carbon and Low Alloy Steels*** (2) If flushing is the only practical means for evaluating the cleanness of internal surfaces, a 20 mesh (850 *m*m, ASTM E 11, Specification for Wire Cloth Sieves for Testing Purposes) or finer filter (or the equivalent) shall be installed and the	The words "and the item flushed with water or other fluid meeting the requirements of paragraph 3.4" are not included in N45.2.1. The note is not included in N45.2.1.

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	item flushed with water or other fluid meeting the requirements of para. 3.4. NOTE: class B cleanness should be specified for carbon steel and low alloy steel surfaces only in special cases because of the difficulty in maintaining such surfaces in that condition after they have been cleaned.	
The system shall be flushed at its normal design velocity (or other velocity if specified by procurement documents) until the screen shows no more than slight particle speckling and no more than slight rust staining.	**3.2.2(a)** The item shall be flushed at the design velocity (or other flow velocity if specified in the procedure) until the screen shows no more than slight speckling (as specified in the procedure in qualitative or quantitative terms, such as the number of particles per unit surface area of the screen) and no more than slight rust staining. 3.2.2(b) The item shall be flushed at the design velocity (or other flow velocity if specified in the procedure) until the screen shows no more than slight speckling (as specified in the procedure in qualitative or quantitative terms, such as the number of particles per unit area of the screen) and no more than slight rust staining.	NQA-1 includes some additional details "(as specified in the procedure in qualitative or quantitative terms, such as the number of particles per unit surface area of the screen)".
There shall be no particles larger than 1/32 inch in any dimension, except fine hairline slivers of less than 1/32 inch thickness are permissible up to 1/16 inch long.	**3.2.2(a)** There shall be no particles larger than 1/32 in. X 1/16 in. long (0.8 mm x 1.6 mm). 3.2.2(b) There shall be no particles larger than 1/32 in. X 1/16 in. long (0.8 mm x 1.6 mm).	Slight difference in description of allowable particles. (1/32 inches in any dimension v 1/32 X 1/16)
There shall be no evidence of organic contamination in the effluent water or on the filter.	**3.2.2(a)** In water flushed systems there shall be no visual evidence of contamination (e.g., oil, discoloration) of the effluent flush water or screen. 3.2.2(b) In water flushed systems there shall be no visual evidence of contamination (e.g., oil, discoloration) of the effluent flush water or screen.	OK
3.1.3 Class C—An intermediate level of cleanness generally applicable to closed service-water systems that cool components containing reactor coolant, engineered safety systems, and other high integrity systems. Surfaces shall meet the requirements for Class B cleanness, except:	**3.2.3 Class C.** An intermediate level of cleanness in which the surfaces meet the requirements for Class B except:	N45.2.1 includes a generally applicable statement. Guidance only. Wording does not establish requirements.
1. Thin uniform rust films are acceptable on carbon steel surfaces.	***(b) Carbon and Low Alloy Steels.*** A uniform light rust bloom which can be removed by brushing or wiping is acceptable.	NQA-1 adds the words "can be removed by brushing or wiring"
2. Scattered areas of rust are permissible provided that the area of rust does not exceed 15 square inches in any 1square foot on corrosion resistant alloys.	***(a) Corrosion-Resistant Alloys.*** Scattered areas of rust are permissible, provided the aggregate area does not exceed 15 sq in. per 1 sq ft area (100 cm^2 per 1000 cm^2).	NQA-1 adds the word "aggregate".

Enclosure 4, Table 1
ANSI N45.2.1-1973 vs NQA-1-1994, Subpart 2.1

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
3. Flush-test filters may exhibit considerable rust staining.	**(c)** ***Corrosion-Resistant Alloys and Carbon and Low Alloy Steels.*** Screens installed for evaluation of internal surfaces by flushing may exhibit considerable particle speckling (as specified in the procedures in qualitative or quantitative terms, such as the number of particles per unit area of the screen) and considerable rust staining.	NQA-1 adds the words in the parenthesis.
3.1.4 Class D—The level of cleanness applicable to fire-protection, open service water, and similar systems requiring only a nominal degree of cleanness. The following are acceptable on items which meet Class D cleanness:	**3.2.4 Class D.** A nominal level of cleanness in which the following are acceptable:	N45.2.1 includes a generally applicable statement. Guidance only. Wording does not establish requirements.
1. Tightly adherent mill scale on carbon steel surfaces.	*(b)* tightly adherent mill scale on nonmachined carbon and low alloy steel surfaces that resist removal by hand scrubbing with a stiff wire brush;	NQA-1 adds the words "and low alloy steel surfaces"
2. Paint or preservative coatings on carbon steel surfaces that will not peel or flake when exposed to cold-water flushing.	(c) paint or preservative coatings on carbon or low alloy steel surfaces that will not peel or flake when subjected to cold water flushing;	NQA-1 adds the words "or low alloy steel surfaces"
3. Rust films on carbon steel and stainless steel surfaces that resist removal by scrubbing with a bristle brush.	*(a)* rust films on both corrosion-resistant alloys and carbon and low alloy steel surfaces;	N45.2.1 includes the words "that resist removal by scrubbing with a bristle brush."
4. If flushing is the only practical means of determining system cleanness, the system shall be evaluated by examining a 14-mesh (ASTM E11-70, Specification for Wire Cloth Sieves for Testing Purposes) or fine filter, or the equivalent, installed on the outlet of the cleaning circuit.	*(d)* particles no larger than 1/16 in. x 1/8 in. long (1.6 mm x 3.2 mm) on a 14-mesh (1.4 *m*m, ASTM E 11), or finer filter (or the equivalent).	Words are different, but intent is same.
The system shall be flushed at its normal velocity until the screen shows no more than occasional particle speckling.		These words not included in NQA-1
There shall be no particles larger than 1/16 inch in any dimension, except hairlike slivers of less than 1/16 inch thickness are permissible up to 1/8 inch long.	*(d)* particles no larger than 1/16 in. x 1/8 in. long (1.6 mm x 3.2 mm) on a 14-mesh (1.4 *m*m, ASTM E 11), or finer filter (or the equivalent).	N45.2.1 states no particles shall be larger than 1/16 inch in any direction – NQA-1 allows for 1/16 inch X 1/8 inch long.
There shall be no evidence of organic contamination on the screen; considerable rust-staining is acceptable.		These words not included in NQA-1
	3.2.5 Summary The cleanness classes are summarized in Table 3.2 of Subpart 2.1.	These words not included in N45.2.1
	3.3 Hydraulic, Instrument Control, and Lubrication Lines and Systems The preceding cleanness classifications and criteria in para. 3.2	These words not included in N45.2.1

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	are primarily applicable to relatively large items which are generally amenable to visual inspection of internal surfaces at some time during manufacture and installation operations. Interior surfaces of hydraulic, instrument control, and lubrication systems are generally not accessible for visual inspection during manufacture and installation, and may have much more stringent requirements on particulate contamination than those specified in the preceding cleanness classes. Where special characteristics and specific requirements are needed for such systems, they shall be specified. Guidelines for classifying hydraulic, instrument, and lubrication cleanness are presented in Part III, Subpart 3.2, Appendix 2.1.	
	3.4 Cleaning and Flushing Fluid Quality Requirements **3.4.2 Gaseous Fluids.** The *requirements for gaseous fluids used* for flushing are dependent upon the particular item being flushed. The requirements for any given item shall incorporate restrictions on particulate contaminants, organic contaminants, water soluble contaminants, and water content as appropriate for the item. **3.4.3 Organic Fluids.** Requirements for organic fluids used for flushing are dependent upon the particular item being flushed. The requirements for any given item shall incorporate restrictions on particulate contaminants, water soluble contaminants, and water content as appropriate for the item. **3.4.4 Fluids for Hydraulic, Instrument Control, and Lubrication Systems.** In addition to the requirements of para. 3.4.1, 3.4.2, or 3.4.3, as applicable for the system being flushed, fluids used for final flushing or rinsing of components and installed systems covered by this paragraph shall	These words not included in N45.2.1
3.2 Water Quality Requirements The selection of the water quality for a specific application shall be made by the organization responsible for the cleaning operations unless otherwise specified in the purchase document.	**3.4.1 Water.** The water quality for mixing cleaning solutions, rinsing, and flushing shall be specified by the organization responsible for cleaning unless otherwise stipulated in procurement documents or approved procedures. Table 3.4.1 lists water quality requirements commonly used for such purposes in nuclear cleaning operations. When fresh water is used on components or systems	NQA-1 goes into greater detail.

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	containing austenitic stainless steel, attention shall be given to methods for minimizing the possible effects of chlorides meet the particulate contamination limits specified in Table 3.4.4 for the system class specified.	
In cases where the water quality for operating systems is lower than that specified below (e.g., open service water systems), the water used for cleaning can be equivalent to the quality of the operating system water.	**4(d)** The quality of fluid used for final flushing or rinsing shall be equivalent to the quality of the operational fluid of the item, unless otherwise specified in approved procedures.	Words are different, but intent is same.
When cleaning water quality is not otherwise specified, it shall comply with the following specifications.	**4(d)** The quality of fluid used for final flushing or rinsing shall be equivalent to the quality of the operational fluid of the item, unless otherwise specified in approved procedures.	Words are different, but intent is same.
Fresh Water Fresh water shall meet the following requirements: *pH at 25 C (77 F) 5.5 to 8* Chloride Less than 100 ppm Fluoride Less than 5 ppm Sulfide Less than 1 ppm Total Dissolved Solids Less than 500 ppm Turbidity Less than 5 Jackson Turbidity Units	**TABLE 3.4.1** **WATER REQUIREMENTS** Fresh water shall meet the following requirements: pH at 25 C (77 F) 5.5 to 8 Chloride Less than 250 ppm Fluoride Less than 5 ppm Sulfide Less than 1 ppm Total Dissolved Solids Less than 500 ppm	Chloride allowance is larger in NQA-1 (250 v 100ppm) Turbidity not mentioned in NQA-1
Demineralized Water Demineralized water shall meet the following requirements: ph at 25 C (77 F) 5.5 to 8 Chloride Less than 1 ppm Fluoride Less than 1 ppm Sulfide Less than 1 ppm Conductivity Less than 3 micromho/cm Silica Less than 0.05 ppm Turbidity Less than 1 Jackson Turbidity Unit	**TABLE 3.4.1** **WATER REQUIREMENTS** High quality water shall meet the following requirements: ph at 25 C (77 F) 5.5 to 8 Chloride Less than 1 ppm Fluoride Less than 1 ppm Sulfide Less than 1 ppm Conductivity Less than 3 micromho/cm Silica Less than 0.05 ppm Total suspended solids Less than 3ppm	N45.2.1 references turbidity, NQA-1 references total suspended solids. This is equivalent.
	3.4.6 The use of contaminated tools shall be avoided. Tools which *contain, or which may become* contaminated with, materials that could contribute to stress-corrosion or intergranular cracking shall not be used on corrosion-resistant alloys.	These words not included in N45.2.1
4. PRE-INSTALLATION	5 CLEANNESS PRIOR TO	Words are slightly different, but intent

Enclosure 4, Table 1
ANSI N45.2.1-1973 vs NQA-1-1994, Subpart 2.1

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
CLEANNESS Items should not be delivered to the point of installation site sooner than necessary unless the installation location is considered a better storage area.	INSTALLATION From a cleanness standpoint, consideration shall be given as to whether items should be delivered to the point of installation sooner than necessary, i.e., whether the installation location is a better storage area [see Subpart 2.2 of this Part (Part II)].	is same.
Inspections, examinations, and tests as appropriate shall be performed immediately prior to installation to determine the cleanness of the item.	Inspections and tests, as appropriate, shall be made immediately prior to installation to determine the cleanness of the item.	OK
If contaminants are detected, they shall be removed if it is judged that they will not be removed in subsequent cleaning operations.	If potentially harmful contaminants are detected, they shall be removed if they will not be removed in subsequent cleaning operations.	NQA-1 adds the words "potentially harmful"
Items having surfaces to which temporary paint or preservative coatings have been applied shall be identified, the composition of the coating and methods for its removal shall be determined and removal of coatings, where required, recorded in the inspection report.	Items having surfaces to which temporary paint or preservative coatings have been applied shall be identified; the composition of the coating and methods for its removal shall be determined and removal of coatings, when required, recorded in the inspection report.	OK
Unless otherwise required by the job specifications, the temporary coatings shall be removed prior to installation of items.	Unless otherwise required by the job specifications, the temporary coatings shall be removed prior to installation of items.	OK
5. INSTALLATION CLEANING The installation process represents an opportunity for the introduction of contaminants into a cleaned item and care should be taken to minimize contamination. Operations which generate particulate matter, such as grinding and welding, should be controlled.	**6 CLEANNESS DURING INSTALLATION** The installation process represents an opportunity for the introduction of contaminants into a cleaned item, and care shall be taken to minimize contamination. Operations that generate particulate matter, such as grinding and welding, shall be controlled.	OK
Local cleanup of contaminated areas is recommended as installation progresses, rather than one cleanup operation when installation is completed.	Cleanup of locally contaminated areas as installation progresses is recommended (rather than one cleanup operation when installation is completed).	OK
Consideration should be given to sequencing installation and erection operations, when practical, to facilitate cleaning and cleanness control.	Consideration shall be given to sequencing of installation and erection operations to facilitate cleaning, cleanness control, and inspection.	OK
Where visual inspection of internal surfaces of a portion of a system can be blocked, that part of the system should be fabricated as a complete unit and a visual inspection should be performed just before the access points are closed.	Insofar as practicable, internal surfaces of a portion of a system that can be blocked or obscured by subsequent operations shall be visually inspected and verified as being clean before the access points are closed.	NQA-1 adds the words "insofar as practicable" and "obscured by subsequent operations"
Openings and pipe ends shall be sealed at all times except when they must be unsealed to carry out necessary operations.	Openings and pipe ends shall be sealed at all times except when they must be unsealed to carry out necessary operations.	OK
Fitted and tack-welded joints (which will not be immediately sealed by welding) shall be wrapped with polyethylene or other nonhalogenated		These words not included in NQA-1

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
plastic film until the welds can be completed.		
Precautions shall be taken to avoid contamination of crevices, blind holes, dead legs, undrainable cavities, and inaccessible areas.	Precautions shall be taken to avoid contamination of crevices, blind holes, dead legs, undrainable cavities, and accessible areas.	N45.2.1 states "inaccessible areas" whereas NQA-1 states "accessible areas".
When grinding, sanding, chipping or wire brushing, the item shall be so oriented that chips fall away from the openings or covers shall be provided for the openings.	When grinding, sanding, chipping, or wire brushing, the item shall be so oriented that chips fall away from the openings, or covers shall be provided for the openings.	OK
Marking materials containing sulfur, lead, zinc, mercury and other low melting alloys as a basic chemical constituent shall not be brought into contact or shall not be used on the surfaces of corrosion resistant alloys.	**4 MANUFACTURING PHASE CLEANNESS** *(b)* Cleaning methods and materials used during manufacture shall be compatible with the materials of construction of the item being cleaned (see para. 2.2.2). Cutting fluids, lubricants, liquid penetrants, marking materials, precleaning solutions, engineering test fluids, tools, and other materials and process compounds to be used on surfaces of items made from austenitic stainless steel or corrosion-resistant alloy during manufacture shall be evaluated from the standpoint of potentially harmful contaminants. Such contaminants include chlorides, fluorides, and low melting point materials such as sulfur, lead, zinc, copper, and mercury. Where potentially harmful quantities of such contaminants can be leached or are in a form that they could be released by breakdown of the compound during subsequent manufacturing, installation, or operation, they shall not be used.	NQA-1 includes more detail. Different words, but same intent.
Low-sulfur, low fluorine, and/or low-chlorine compounds may be used on austenitic stainless steels. Low-sulfur, low lead compounds may be used on nickel-base alloys.	The use of mineral acids and organic acids to clean austenitic stainless steel and nickel alloys shall be evaluated and approved prior to use.	Wording is different but overall intent is similar.
Paints, chalk and other temporary marking materials shall be removed by solvent-wiping or mechanical means.	*(b)* ... Paint, chalk, scribing inks, and other temporary marking materials shall be removed from the affected surfaces prior to heat treatment or welding.	N45.2.1 is more specific in how they shall be removed.
Surfaces should be cleaned after completion of work on them, before proceeding to the next installation or construction step.	Surfaces shall be visually inspected upon completion of work on them, and obvious contamination removed before proceeding to the next installation or construction step.	OK
The use of mineral acids and organic acids on austenitic stainless steels and nickel alloys should be avoided except when the material is in the solution annealed condition.	The use of cleaning methods and materials, cutting fluids, lubricants, liquid penetrants, marking materials, precleaning solutions, engineering test fluids, tools, and other materials and process compounds used during installation of items made from austenitic stainless steel or other corrosion-resistant alloys shall be subject to the limitations on such methods and materials specified in	Wording is different but intent is same.

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	Section 4.	
Pre-cleaning and post-cleaning of weld joint areas and welds shall be performed by wire brushing and scrubbing with a solvent-moistened clean cloth unless specified otherwise	Precleaning and post-cleaning of weld joint areas and welds shall be performed by wire brushing and scrubbing with a solvent-moistened clean cloth unless otherwise specified.	OK
	Large openings, such as the open reactor vessel, shall be protected against falling and windblown contaminants.	These words not included in N45.2.1
	TABLE 3.4.4 FLUSHING REQUIREMENTS FOR HYDRAULIC, INSTRUMENT CONTROL, AND LUBRICATION SYSTEMS	This table not included in N45.2.1
	4 MANUFACTURING PHASE CLEANNESS The cleanness of an item at the point of manufacture is critical to the final cleanness level ultimately attained after installation. Where practicable, the cleanness classification of an item listed in the purchase specification shall be the same as that for final service. The capability of construction site cleaning operations may not be sufficient to upgrade the cleanness level of a complex item since a much wider variety of cleaning facilities and procedures are generally available for use at the manufacturer's shops than are available at the construction sites. Purchase specifications shall specify the required as shipped cleanness level for the item. Shop cleaning procedures shall be in accordance with para. 2.2, and inspection and test results shall be documented, as appropriate, in accordance with approved procedures. Listed below are cleaning considerations that are appropriate to all manufacturing operations. Additional information is presented in ASTM A 380-78 where applicable, they shall be considered. *(a)* Operations which generate chemical or particulate contaminant such as welding and grinding shall be controlled during fabrication steps, after which removal of such contaminants becomes difficult because of limited access. Under such conditions, protection of openings shall be provided to prevent entry of contaminants, especially particulate contaminants. If practical, manufacturing sequence shall be based on considerations related to cleaning of individual items as the	These words not included in N45.2.1

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	component is assembled, unless the component is readily cleanable in its final assembled state. (c) Use of tools, such as those used for grinding, polishing, filing, deburring, and brushing during manufacture shall be controlled when surface contamination of the item from such tools is considered an important factor. *(d)* The quality of fluid used for final flushing or rinsing shall be equivalent to the quality of the operational fluid of the item, unless otherwise specified in approved procedures (see para. 3.4.1). Particular attention shall be paid to flushing of pockets, crevices, or dead legs to assure that cleaning solutions are not trapped in such areas. (e)Fresh water may be used for mixing oil cleaning solutions and for initial rinsing and flushing when permitted by approved procedures. *(f)* The final cleaned item shall be sealed in a dried condition to prevent subsequent recontamination and then packaged in accordance with the requirements established in the procurement documents.	
6. MAINTENANCE OF INSTALLATION CLEANNESS After any isolable system has been installed in a clean condition and cleanness control measures have been established, access control into the system is essential to minimize the introduction of contaminants between the time of system isolation and pre-operational testing.	**7 MAINTENANCE OF INSTALLATION CLEANNESS** After any isolable item has been installed in a clean condition, cleanness control measures and access control shall be established to minimize the introduction of contaminants between the time of system isolation and preoperational testing.	OK
Access control shall be established to exclude personnel and contaminants.	Control of tools, loose items, and access shall be maintained in accordance with applicable requirements.	Similar words but same intent
Where environmental contamination could cause degradation of quality, seals must be installed which must be hermetically tight and difficult to remove.	Where environmental contamination could cause degradation of quality, seals shall be installed to prevent contamination of interior surfaces.	N45.2.1 includes the words "which must be hermetically tight and difficult to remove"
Gasketed metal seals with welded metal strap closures, or seal welded metal caps are recommended for Class B systems and components.		Guidance only. Wording does not establish requirements.
Items in this condition shall be tagged with identifications and instructions for seal removal.	Removal shall be only with proper authorization. Seals shall be installed in a manner to prevent accidental removal.	Similar words, same intent
If access to a sealed system is required, precautions shall be taken to prevent introduction of contaminants.	If access to such sealed items is required, precautions shall be taken to prevent introduction of contaminants.	OK
Prior to opening the seals, the immediate surroundings should be cleaned to remove solid contaminants	Such precautions include masking and tenting of surrounding areas with plastic film or tape, cleanup of the	OK

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
which might be introduced in the system.	immediate surroundings to remove particulate matter that can be introduced into the opening	
Personnel entering the system should wear clean outer clothing and shoe covers.	...requiring personnel to wear clean outer clothing and shoe covers, etc.	OK
When the necessary work is completed, the interior surface shall be locally cleaned to its original condition and the system should be resealed.	When the necessary work is completed, the interior surface shall be locally cleaned, if necessary, to its original condition and the item resealed.	OK
	Materials used for sealing items made from austenitic stainless steel or other corrosion-resistant alloys shall be subject to the limitations specified in Section 4	These words not included in N45.2.1
7. PRE-OPERATIONAL CLEANING **7.1 Preparations** Cleaning and flushing operations shall be scheduled so as to minimize interference from other plant operations.	**8 PREOPERATIONAL CLEANING** **8.1 Preparations** Insofar as practicable, cleaning and flushing operations shall be scheduled so as to minimize interference from other plant operations.	NQA-1 states "insofar as practicable"
Areas in which cleaning operations are being performed shall be isolated to the extent that personnel performing other construction phase operations are aware that the cleaning operations are being conducted.	Areas in which cleaning operations are being performed shall be isolated and marked to the extent that personnel performing other construction phase operations are aware that the cleaning operations are being conducted.	OK
Personnel shall be familiarized with the intended procedure and associated hazards.	Personnel shall be familiarized with the intended procedure and associated hazards.	OK
Means for communicating shall be provided between the local areas in which the cleaning is performed and any remote areas (e.g., control rooms) that may be related to the cleaning operations.	Means for communicating shall be provided between the local areas in which the cleaning is performed and any remote areas (e.g., control rooms) that may be related to the cleaning operations.	OK
Loose tools should be attached to either the workman or the exterior of the system with a lanyard.	Tools and other loose items in controlled areas shall be controlled as specified in Section 7.	NQA-1 includes "and other loose items"
The actual circulating flow path shall be checked for agreement with specified requirements in regard to location, position and status of all components.	The actual circulating flow path shall be checked for agreement with specified requirements with regard to location, position, and status of all components.	OK
Critical valves, controls and switches shall be tagged to prevent inadvertent actuation during the cleaning operation.	Critical valves, controls, and switches shall be tagged to prevent inadvertent actuation during the cleaning operation.	OK
The interior of all accessible components (e.g., tanks) and large diameter piping shall be inspected for cleanness; all debris and contamination shall be removed.	The interior of all accessible components (i.e., tanks) and large diameter piping shall be inspected for cleanness; all debris and contamination shall be removed.	OK
Demineralizers, filters, instruments, valve internals and other items that may be damaged by the cleaning process shall be blanked off, bypassed or removed.	Demineralizers, filters, instruments, valve internals, and other items that may be damaged by the cleaning process shall be blanked off, bypassed, or removed.	OK
Protective screens shall be installed on the suction side of all pumps and other	Protective screens shall be installed on the suction side of all pumps and	OK

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
components that may be subject to damage during the cleaning operations.	other components that may be subject to damage during the cleaning operations.	
Instrumentation (e.g., pressure temperature and flow) shall be used where possible to monitor the cleaning operations.	Instrumentation (e.g., pressure, differential pressure temperature, and flow) shall be used as necessary to monitor flushing and recirculatory cleaning operations.	OK
All other permanently installed instrumentation shall be isolated where possible.	Instrumentation installed in the system but not used to monitor the cleaning operations shall be isolated where necessary.	OK
Cleaning should be completed before installation of fuel, reactor vessel internals and control rods.	Cleaning of the reactor vessel and reactor vessel internals shall be completed before installation of fuel and control rods.	NQA-1 adds the words "of the reactor vessel and reactor vessel internals"
Provisions shall be made to collect leakage and to protect insulation from being wetted. Where the use of installed plant components, such as pumps, may be affected by the cleaning operations, recommendations shall be obtained from the component manufacturers regarding the use of their components.	Provisions shall be made to collect liquid leakage and to prevent wetting of insulation. Where the use of installed plant components such as pumps may be affected by the cleaning operations, recommendations shall be obtained from the component manufacturers regarding precautions to be taken for the use of their components.	OK
Procedures used to protect installed components which are not used in the cleaning operations but which are included in the cleaning circuit should he reviewed.	Procedures shall be established to protect or isolate installed components that could be adversely affected by cleaning or flushing operations.	OK
7.2 Flushing and Cleaning Methods **7.2.1** Water Flushing. If the intended level of cleanness has been maintained during erection of the plant, only water flushing will be required.	**8.2 Flushing and Cleaning Methods** **8.2.1 Flushing.** If the intended level of cleanness has been maintained during erection of the plant, only flushing or rinsing will normally be required.	N45.2.1 states water flushing, NQA-1 uses the term flushing (applicable throughout this section)
The system shall be filled with water of the quality specified and flushed in accordance with approved procedures.	The system shall be filled with fluid of the type and quality specified and flushed in accordance with approved procedures.	OK
Completion of flushing shall be determined by filter, turbidimetric or chemical analyses. If the final flushes for removal of particulate contaminants are directed toward the reactor vessel, soluble contaminants shall be removed from the system by first flushing away from the reactor vessel until a specified water quality is achieved on the effluent from the system.	Completion of flushing shall be determined by filter, turbidimetric or chemical analysis, or any combination of these, as applicable. If flushes are directed toward the large components, provisions shall be made to prevent contaminants from collecting in areas where they cannot be removed in subsequent cleaning operations.	OK
At this time, high velocity flushes may be made toward the reactor vessel.	If flushes are directed toward the large components, provisions shall be made to prevent contaminants from collecting in areas where they cannot be removed in subsequent cleaning operations.	OK
This procedure is not recommended unless reactor vessel internal surfaces are accessible for subsequent mechanical cleaning and inspection, or unless provisions are made to collect		Guidance only. Wording does not establish requirements.

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
particulate contaminants at some accessible location within the reactor vessel by filtration or other technique.		
After system flushing is completed, but before system drain, all pockets and dead legs shall be flushed through their drain connections.	After system flushing is completed, but before draining, all pockets and dead legs shall be thoroughly flushed.	OK
If conditioned water is used, particular attention should be given to assure that large volumes of solution do not remain trapped in the system.	Where conditioned water is used, particular attention should be given to assure that large volumes of solvent do not remain trapped in the system.	OK
Care shall be taken to assure that organics do not remain on the surfaces.	Provisions shall be made to assure that organics do not remain on the surfaces.	OK
A final flush with demineralized water is desirable, but is not necessarily required at this time.		Guidance only. Wording does not establish requirements.
The system shall be sealed to prevent the subsequent entry of contamination. If no further cleaning is required, system layup may be performed.	After cleaning, the item shall be sealed where appropriate to prevent the subsequent entry of contaminants. If no further cleaning is required, system layup shall be performed if specified.	OK
7.2.2 Alkaline Cleaning. Although it shall be the intent of those involved in erecting the nuclear plant to install piping systems in a clean condition, this may not be achieved.	**8.2.2 Alkaline Cleaning.** Although it is the intent of those involved in erecting the nuclear plant to install piping systems and components in a clean condition, this may not be fully achieved.	OK
One relatively common source of organic contamination in piping systems is lubricating oils from air tools.	Common sources of organic contamination in items are lubrication oils from air tools, preservative films, and valve lubricants.	OK
When local cleanup is not performed following grinding operations on internal surfaces of piping welds, full system cleaning to remove organic contaminants may be necessary.	When immediate local cleanup is not performed, full item cleaning to remove such organic contaminants may be necessary.	OK
If required the cleaning shall be performed according to the cleaning procedures established for the operation and the procedure shall assure that quantities of organics do not remain on the surfaces.	Such cleaning shall be performed according to the cleaning procedures established for the operation, and the procedure shall assure that quantities of organic contaminants do not remain on the surfaces.	OK
Alkaline cleaning should consist of the circulation of an appropriately heated solution until a selected area or a coupon contaminated with the expected contamination is cleaned by the cleaning solution.	Alkaline cleaning consists of the circulation of an appropriately heated solution until a selected area represented by the worst contamination or a coupon contaminated with the expected contamination is cleaned by the cleaning solution to the specified cleanness level.	OK
After system cleaning is completed, a flush with water of a quality consistent with the system requirements shall be performed to remove the cleaning agents.	After item cleaning is completed, the item shall be flushed with water of the specified quality to remove the cleaning agents.	OK
In particular, all pockets and dead legs should be flushed and attention should be given to assure that large volumes of solution do not remain in the system.	In particular, all pockets and dead legs shall be flushed and attention given to assure that large volumes of solution do not remain.	OK
The system should be sealed to prevent the subsequent entry of	Where appropriate, the item shall be sealed to prevent subsequent	OK

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
contamination.	contamination.	
If no further cleaning is required, system layup may be performed.	If no further cleaning is required, system layup shall be performed, if specified.	OK
Precautions related to the use of alkaline cleaning solutions are listed in paragraph 7.3.	Precautions related to the use of alkaline cleaning solutions are listed in Part III, Subpart 3.2, Appendix 2.1.	OK
7.2.3 Chelate Cleaning. Chelate cleaning of carbon or low-alloy steel surfaces to remove light corrosion product films is not a required cleaning operation.	**8.2.3 Chelate Cleaning.**	Guidance only. Wording does not establish requirements.
If chelating cleaning is used, flushing with water of a quality consistent with the system requirements should be performed to remove the chelating agents.	Unless it is considered desirable to leave a film of chelating agent on the surfaces as a protective film, the item shall be flushed with water of a quality consistent with the item requirements to remove residual chelating agents.	OK
All pockets and dead legs in particular should be flushed and attention should be given to assure that large volumes of the chelating solution do not remain in the system.	If chelate cleaning is used, attention shall be given to all pockets and dead legs to ensure that large volumes of solution do not remain in the item.	OK
The system should be sealed to prevent the subsequent entry of contaminants. If no further cleaning is required, layup may be performed.	Where appropriate, items shall be sealed to prevent subsequent contamination. If no further cleaning is required, layup shall be performed, if specified.	OK
Precautions related to the use of chelating agents are listed in paragraph 7.3.	Precautions related to the use of chelating agents are listed in Part III, Subpart 3.2, Appendix 2.1.	OK
7.3 Cleaning Precautions There are a number of precautions that should be observed during cleaning operations. The following should be considered as appropriate.	**8.2.2 Alkaline Cleaning** Precautions related to the use of alkaline cleaning solutions are listed in Part III, Subpart 3.2, Appendix 2.1.	Similar words – same intent
1. The addition of a suitable chloride stress cracking inhibitor is recommended if fresh water flushing of systems containing austenitic stainless steels is planned.	**3.4.1 Water** When fresh water is used on components or systems containing austenitic stainless steel, attention shall be given to methods for minimizing the possible effects of chlorides.	Similar words – same intent
2. The use of alkaline cleaning compounds which contain free caustic is not recommended on components or systems in which cleaning solutions may be entrapped. Cleaners based on compounds which produce hydroxylions by hydrolysis, such as tri-sodium phosphate, are recommended. If heavy organic solids are present, the addition of an emulsifier and a wetting agent may be considered.	Part II refers to **Appendix 2.1 "Nonmandatory Guidance on Cleaning of Fluid Systems and Associated Components for Nuclear Power Plants"** **3(a)** The use of alkaline cleaning compounds that contain free caustic is not recommended on components or systems in which cleaning solutions may be entrapped. Cleaners based on compounds that produce alkaline solutions by hydrolysis, such as phosphate compounds, are recommended. If heavy organic contaminants are present, the addition of an emulsifier and a wetting agent should be	Similar words – same intent

Enclosure 4, Table 1
ANSI N45.2.1-1973 vs NQA-1-1994, Subpart 2.1

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	considered.	
3. The use of acid-chelating agents on welded or furnace sensitized stainless steels and nickel base alloys is not recommended.	Part II refers to **Appendix 2.1 "Nonmandatory Guidance on Cleaning of Fluid Systems and Associated Components for Nuclear Power Plants"** **3(b)** The use of acid-chelating agent on welded or furnace sensitized stainless steels and nickel base alloys is not recommended.	Similar words – same intent
4. The use of halogenated organic solvents is not recommended, except upon crevice-free, open, freely evaporating surfaces. This recommendation is not intended to prohibit the use of such solvents under other conditions, providing adequate removal is assured prior to any subsequent operations.	Part II refers to **Appendix 2.1 "Nonmandatory Guidance on Cleaning of Fluid Systems and Associated Components for Nuclear Power Plants"** **3(c)** The use of halogenated organic solvents is not recommended, except upon crevice-free, open, freely evaporating surfaces. This recommendation is not intended to prohibit the use of such solvents under other conditions, providing adequate removal is assured prior to any subsequent operations.	Similar words – same intent
5. Acid cleaning of installed systems is not recommended. however, if used, particular attention shall be given to:	**3.4.5** If acid cleaning is used, particular attention shall be given to:	N45.2.1 includes the words "is not recommended"
(a) Avoiding the entrapment of acids in the crevices.	*(a)* avoidance of entrapment of acids in crevices;	OK
(b) Avoiding contact with either welded or furnace sensitized corrosion resistant alloys, and non-ferrous materials.	*(b)* effects on either welded or sensitized corrosion-resistant alloys and nonferrous materials;	OK
(c) Complete removal of any residual acid solution from the system.	(c) complete removal of any residual acid solution from the item;	N45.2.1 uses the term "system", NQA-1 states "item" – these are equivalent.
(d) Neutralization treatment as a final operation.	*(d)* neutralization treatment followed by thorough rinsing or flushing.	OK
7.4 Control of Cleaning Solutions Cleaning solutions should be prepared in accordance with the applicable cleaning procedure and shall be checked for proper chemical composition and effectiveness of inhibitors (if used).	**2.4 Control of Cleaning Solutions** Cleaning solutions shall be prepared in accordance with the applicable cleaning procedure and shall be checked for proper chemical composition and effectiveness of inhibitors, if used.	OK
Solution temperatures must be maintained and controlled to assure adequate cleaning and to prevent *decomposition and possible damage* to the system.	Solution temperatures shall be maintained and controlled to ensure adequate cleaning and to prevent *cleaning agent decomposition and* possible damage to the item.	OK
	10 POST-OPERATIONAL REPAIRS AND MODIFICATIONS Subpart 2.1 does not address radioactive decontamination operations that may be required prior to post-operational repairs or system modifications, although some of its	These words not included in N45.2.1

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	requirements may be applicable to such decontamination operations. For the purposes of maintenance of cleanness as defined in Subpart 2.1, post-operational repairs or system modifications shall be considered identical to preoperational installation procedures and treated in accordance with Sections 5, 6, and 7. If system cleaning following repair or modification operations is deemed necessary, such cleaning shall be performed in accordance with Section 8, except that flushes directed toward the reactor vessel shall, to the extent possible, first be preceded with flushes directed away from the reactor vessel until expected contamination is removed and the specified water quality level is achieved. If layup is deemed necessary, it shall be performed in accordance with Section 9.	
8. LAYUP AND POST-LAYUP CLEANING **8.1** Upon completion of pre-operational cleaning, unless the system is to be released for the next series of operations or tests, the system should be placed in layup condition, if required, by filling with dry inert gas, the process fluid that will be used in the system during operation, water of purity equivalent to that used to make up the system, or chemically-conditioned water.	**9 LAYUP AND POST-LAYUP CLEANING** Upon completion of preoperational cleaning, unless the item is to be released for the next series of operations or tests, the item shall be placed in layup condition by filling with dry, contaminant-free inert gas or dry air; the process fluid that will be used in the system during operation; fluid of purity equivalent to that used to make up the system; chemically conditioned fluid; or other specified method.	OK
8.2 Prior to the next series of operations or tests residual cleaning solutions or layup chemicals shall be removed from the system by flushing, or draining and filling until the effluent water from the system meets the pre-operational test water quality requirements for the system.	Prior to the next series of operations or tests, residual cleaning solutions or layup media shall be removed, if required, from the item by flushing or by draining and filling until the effluent fluid from the item meets the preoperational test fluid quality requirements for the system.	OK
9. RECORDS Record copies of completed procedures; reports; personnel qualification records; test equipment calibration records, test deviation or exception records; inspection and examination records shall be prepared.	**11 RECORDS** The following shall be prepared: *(a)* record copies of procedures; *(b)* reports; (c) test equipment calibration records; *(d)* test deviation or exception records; (e) inspection and examination records; *(f)* other records necessary to document the cleaning and cleanness history of the items during manufacture, shipment, storage, installation, preoperational cleaning, modifications, and repairs.	N45.2.1 includes "personnel qualification records".
These shall be placed with other	These records shall be retained with	OK

ANSI N45.2.1-1973	NQA-1 (1994) Subpart 2.1 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
project records as required by code, standard, specification, or project procedures.	other project records as required by code, standard, specification, or project procedures.	
Collection, Storage and maintenance records shall be in accordance with ANSI *N45.2.9*.	BR17 "Quality Assurance Records" Records that furnish documentary evidence of quality shall be specified, prepared, and maintained.	Similar words, same intent.
10. REVISION OF ANSI STANDARDS REFERRED TO IN THIS DOCUMENT When the following standards referred to in this document are superseded by a revision approved by the American National Standards Institute, the revision shall apply. N45.2 Quality Assurance Program Requirements for Nuclear Power Plants N45.2.3 Housekeeping During the Construction Phase of Nuclear Power Plants Qualification of Inspection, N45.2.6 Qualification of Inspection, Examination, and Testing Personnel for the Construction Phase of Nuclear Power Plants N45.2.9 Requirements for Collection, Storage and Maintenance of Quality Assurance Records **N45.2.10* Terms and Definitions *These Standards are being approved by The American National Standards Institute and they should be available in 1973.		N/A - These words not included in NQA-1 nor would they be expected to be.

Enclosure 4, Table 2
ANSI N45.2.2-1972 vs NQA-1-1994, Subpart 2.2

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
1. INTRODUCTION **1.1 Scope** This standard defines requirements for packaging, shipping, receiving, storage, and handling of nuclear power plant items.	**1 GENERAL** Subpart 2.2 provides amplified requirements for packaging, shipping, receiving, storage, and handling of nuclear power plant items.	OK
These items include the parts of structures, systems, and components whose satisfactory performance is required for the plant to operate reliably, to prevent accidents that could cause undue risk to the health and safety of the public, or to mitigate the consequences of such accidents if they were to occur.	**Part II** **Introduction** The requirements of this Part (Part II) apply to fabrication, construction, modification, repair, maintenance, and testing activities that affect the quality of structures, systems, and components for nuclear facilities.	QAPP Section 1.2 "Scope" establishes applicability.
The requirements stated herein deal with the protection and control necessary to assure that the requisite quality of those important parts of the plant are preserved from the time items are fabricated until they are incorporated in the plant.	**Part II** **Introduction** The requirements of this Part (Part II) apply to fabrication, construction, modification, repair, maintenance, and testing activities that affect the quality of structures, systems, and components for nuclear facilities.	QAPP Section 1.2 "Scope" establishes applicability.
This standard is intended to be used in conjunction with ANSI N45.2, Quality Assurance Program Requirements for Nuclear Power Plants. The requirements may also be extended to other appropriate parts of nuclear power plants when specified in contract documents.	It supplements the requirements of Part I and shall be used in conjunction with applicable Basic and Supplementary Sections of Part I when and to the extent specified by the organization invoking Subpart 2.2.	Slightly different words, but same intent.
1.2 Applicability The requirements of this standard apply to the work of any individual or organization that participates in the packaging, shipping, receiving, storage and handling of items to be incorporated into nuclear power plants as discussed in Subsection 1.1 of this standard.	**Part II** **Introduction** These activities include the performing function of attaining quality objectives and verifying that activities affecting quality have been correctly performed.	QAPP Section 1.2 "Scope" establishes applicability.
The extent to which the individual requirements of this standard shall apply will depend upon the nature and scope of the work to be performed and the importance of the item or service involved.	**Introduction** **Section 2 "Applicability"** To the extent applicable to the activities being performed, the application of this Part (Part II) or portions thereof, and the provisions of Part 1, Basic and Supplementary Requirements, shall be specified in written contracts, policies, procedures, or instructions.	Slightly different words, but same intent.
The requirements are intended to assure that the quality of items is not degraded as a result of packaging, shipping, receiving, storage, and handling practices and techniques.	**BR 13 "Handling, Storage, and Shipping"** Handling, storage, cleaning, packaging, shipping, and preservation of items shall be controlled to prevent damage or loss and to minimize deterioration.	Slightly different words, but same intent.
1.3 Responsibility	**BR 1 "Organization"**	In addition, QAPP Section 2.0"Organization" and 3.0

Enclosure 4, Table 2
ANSI N45.2.2-1972 vs NQA-1-1994, Subpart 2.2

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
The organization or organizations responsible for establishing the applicable requirements for the activities covered by this standard shall be identified and the scope of their responsibilities shall be documented.	The organizational structure, functional responsibilities, level of authority, and lines of communication for activities affecting quality shall be documented.	"Responsibility" establish responsibility.
The work of establishing practices and procedures and providing the resources in terms of personnel, equipment and services necessary to implement the requirements of this standard may be delegated to other organizations and such delegation also shall be documented.	**BR 1 "Organization"** **Section 2.2** The individual(s) or organization(s) responsible for establishing and executing a quality assurance program under this Standard may delegate any or all of the work to others but shall retain responsibility.	QAPP Section 2.0 "Organization" also details delegation and the need for documenting said function.
However, it is the responsibility of each organization performing work covered by this standard to comply with the procedures and instructions issued for the project and to conform to the requirements of this standard applicable to his work.	**Introduction** **Section 3 "Responsibility"** The organization upon which this Part (Part II), or portions thereof, is invoked shall be responsible for complying with the specified requirements.	Slightly different words, but same intent.
The following shall be used as a guide in determining those responsibilities which shall be established and documented:		Guidance only. Wording does not establish requirements. (Same for 1-7 below).
1. Classification of items (protection level)		
2. Packaging design and methods		
3. Shipping requirements and methods		
4. Receiving requirements and methods		
5. Storage requirements and procedures		
6. Handling requirements and procedures		
7. Records		
1.4 Definitions The following definitions are provided to assure a uniform understanding of select terms as they are used in this standard.	**1.1 Definitions** The following definitions are provided to assure a uniform understanding of unique terms as they are used in Subpart 2.2.	OK
Barrier — A flexible material designed to withstand the penetration of water, water vapor, grease, or harmful gases.	*barrier* — a flexible material designed to withstand the penetration of water, water vapor, grease, or harmful gases	OK
Carrier — The transporting agency.	*carrier* — the transporting agency	OK
Classification — The organization of items according to their susceptibility to damage during shipping, receiving and storage only. It does not relate to the function of the item in the completed system.	*classification* — the organization of items according to their susceptibility to damage during shipping, receiving, and storage only. It does not relate to the function of the item in the completed system.	OK
Documentation — Any written or pictorial information describing, defining, specifying, reporting, or certifying activities, requirements, procedures or results.	**I Introduction** **Section 4 "Terms and Definitions"** Document – any written or pictorial information describing, defining, specifying, reporting, or certifying activities, requirements, procedures, or	NQA-1 provides additional details on when a document is considered a Quality Assurance Record.

Enclosure 4, Table 2
ANSI N45.2.2-1972 vs NQA-1-1994, Subpart 2.2

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	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 Supplement.	
Dynamic Load Test — A test to demonstrate the ability of hoisting equipment to safely handle its rated load by exercising the equipment through vertical and horizontal movement along its lines of travel, using a load of specified weight.	*dynamic load test* — a test wherein designated loads are hoisted, rotated, or transported through motions and accelerations required to simulate handling of the intended item	Different words are used, but intent is same.
Handling — The act of physically moving items by hand or by mechanical machinery, not including transport modes.		No definition of this exists in NQA-1.
Item — Any level of unit assembly, including system, subsystem, subassembly, component, part, or material.	**I Introduction** **Section 4 "Terms and Definitions"** Item – an all-inclusive term used in place of any of the following: *appurtenance, assembly, component,* equipment, material, module, part, structure, subassembly, system, or unit.	Definitions are slightly different but intent is same.
Nonconformance — A deficiency in characteristic, documentation, or procedure which renders the quality of an item unacceptable or indeterminate. Examples of nonconformance include: physical defects, test failures, incorrect or inadequate documentation, and deviation from prescribed processing, inspection or test procedures.	**I Introduction** **Section 4 "Terms and Definitions"** Nonconformance – a deficiency in characteristic, documentation, or procedure that renders the quality of an item or activity unacceptable or indeterminate	N45.2.2 provides examples.
Package — The shipping container plus the contents of the container.		No definition of this exists in NQA-1.
Package Unit — Any assembly of mechanical and/or electrical components and parts which can be disassembled without destroying the integrity of the individual parts.		No definition of this exists in NQA-1.
Receiving — To take delivery of material at the construction site or other location designated by the purchaser.	**I Introduction** **Section 4 "Terms and Definitions"** Receiving – taking delivery of an item at a designated location	OK
Storage — The act of holding items at the construction site or in an area other than its permanent location in the plant.	*storage* — the act of holding items in storage facilities	OK
Storage Facilities — Warehouse or yard area designated and prepared for holding of items.	*storage facilities* — warehouse, yard, or other areas designated and prepared for holding of items	OK
Transit Carrier (Open) — Trucks, Trailers, Railroad cars, Barges, Aircraft, or Ships which *do not* provide protection of items from the environment.		No definition of this exists in NQA-1.
Transit Carrier (Closed) — Trucks, Trailers, Railroad cars, Barges, Aircraft or Ships which *do* provide protection of items from the environment by nature of their inherent design.		No definition of this exists in NQA-1.
Transportation Mode — A method identified by the conveyance used for	*transportation mode* — a method identified by the conveyance used for	OK

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
transportation of items and includes any motor vehicles, ships, railroad *cars, or aircraft. Each cargo-carrying* body (trailer, van, boxcar, etc.) is a separate vehicle.	transportation of items and includes any motor vehicles, ships, railroad *cars, or aircraft. Each cargo carrying* body (trailer, van, boxcar, etc.) is a separate vehicle.	
Wrap — A flexible material, formed around the item or package to exclude dirt and to facilitate handling, marking or labeling.	*wrap* — a flexible material formed around the item or package to exclude dirt and to facilitate handling, marking, or labeling	OK
Other terms and their definitions are contained in ANSI N45.2.10	NQA-1 Introduction contains many of the definitions that were in N45.2.10	These words are not in NQA-1 nor would they expected to be.
1.5 Referenced Documents Other documents that are required to be included as a part of this Standard are either identified at the point of reference or described in Section 9 of this Standard.	**Introduction** **Section 7 "Referenced Codes, Standards, and Specifications"** All codes, standards, and specifications that are referenced as a part of this Part (Part II) are listed in the Table entitled "Codes, Standards, and Specifications Referenced in Text."	Slightly different words, but same intent.
The issue or edition of the referenced document that is required will be specified either at the point of reference or in Section 9 of this standard.	Codes, standards, and specifications referenced in this Part (Part II) may be identified with the applicable date or reference at the point of reference or in the Table "Codes, Standards, and Specifications Referenced in Text." Where no specific date or edition is identified, the latest published version shall be used unless contractual documents stipulate otherwise.	NQA-1 adds the clarification on what to do when a specific date or edition is not identified.
2. GENERAL REQUIREMENTS This section contains requirements that are to be fulfilled by the organization or organizations responsible for performing any segment of work described in Sections 3 through 8 of this standard.	**Introduction** **Section 1 "Purpose"** This Part (Part II) sets forth the quality assurance requirements for the planning and execution of identified tasks during the fabrication, construction, modification, repair, maintenance, and testing of systems, components, and structures for nuclear facilities.	Slightly different words but same *intent.*
Measures shall be established and implemented for the packaging, shipping, receiving, storage and handling of specified items to be incorporated in the nuclear power plant, and for the inspections, examinations, testing and documentation to verify conformance to specified requirements.	**2 GENERAL REQUIREMENTS** Measures shall be established and implemented for the packaging, shipping, receiving, storage, and handling of specified items to be incorporated in the nuclear power plant, and for the inspection, testing, and documentation to verify conformance to specified requirements.	N45.2.2 includes the word "examinations". Same intent/results.
2.1 Planning The specific items to be governed by this standard shall be identified.	Introduction 2 Applicability An appropriate Quality Assurance Program, based on the nature and scope of the work to be performed and the relative importance of the items or services, shall be specified in contractual documents by selective	QAPP Section 1.2, "Scope" provides for identification of items to which the QAPP is applied.

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	applications of portions of Part I, Basic and Supplemental Requirements, for programmatic activities and of this Part (Part II) for work oriented activities.	
Planning shall take into account the need for the preparation and control of procedures and work instructions as necessary to comply with specified requirements.	**2.1 Planning and Procedures** Planning and procedure preparation shall be in accordance with the requirements of the Introduction to this Part (Part II).	Slightly different words, but same intent.
Planning shall include a review of the design specifications and drawings for the items covered by this standard to assure that packaging, shipping, receiving, storage, and handling activities have been incorporated and that they can be accomplished as specified.	**Introduction** **Section 4.1 "Planning"** Planning shall include a review of the structure, system or component design/procurement specifications, materials, lists, drawings, construction work plans and schedules to ensure that fabrication, installation, modification, inspection, testing, etc., activities have been incorporated; that the work can be accomplished as specified; and that time and resources, plus training, are sufficient to accomplish the work in accordance with the specified requirements.	NQA-1 provides some additional details, but the intent is similar.
2.2 Procedures and Instructions Procedures and instructions shall be generated, used, and maintained current; these shall contain sufficient detail to provide for the listed items (see Subsection 2.1 of this Standard) a basis for packaging design, shipping requirements, receiving, storage and handling procedures, implementation thereof, and inspection, in accordance with this standard.	**Introduction** **Section 4.2 "Procedures"** Installation, inspection, test procedures, and work instructions identified during planning shall be prepared. Preparation and approval of the procedures/instructions shall be in advance of the need to use the documents. The documents shall be kept current and revised as necessary to assure that the work is performed in accordance with the latest approved information.	N45.2.2 is more specific, however intent of developing, using, and maintaining procedures is similar.
2.3 Results Inspection and test results shall be documented in a suitable test report or data sheet.	**BR 10 "Inspection"** Inspection results shall be documented. **BR 11 "Test Control"** Test results shall be documented..."	NQA-1 does not include words "in a suitable test report or data sheet".
Each report shall identify the item to which it applies, the procedures or instruction followed in performing the task and the identification of the following:	**Supplement 10S-1 "Supplementary Requirements for Inspection"** **Paragraph 9** Records shall, as a minimum, identify (a) through (f) below:	Supplement 11S-1 contains similar words to 10S-1. NQA-1 does not include words "the procedures or instruction followed in performing the task".
(1) Conditions encountered which were not anticipated, including nonconformance.	(f) reference to information on action taken in connection with nonconformances	Slightly different words, but same intent.
(2) Identity of inspector or tester.	(c) inspector	OK
(3) Completion date.	(b) date of inspection	Slightly different words, but same intent.
Test reports and data sheets shall include an evaluation of the acceptability of inspection and test	(e) results or acceptability and 11S-1 Paragraph 5(g) person	Slightly different words, but same intent.

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
results and provide for identifying the individual who performed the evaluation.	evaluating test results.	
2.5 Personnel Qualifications Those personnel who perform inspection, examination or testing activities at the job site shall be qualified in accordance with *N45.2.6.*	**Introduction** **Section 5 "Qualification of Personnel"** Inspection, test, and nondestructive examination personnel and laboratory technicians shall be trained and qualified/certified in accordance with the applicable portions of Part 1, Basic and Supplementary Requirements.	Slightly different words, but same intent. N45.2.2 uses the words "at the job site".
Off-site inspection, examination or testing shall be audited and monitored by personnel who are qualified in accordance with N45.2.6.	**Introduction** **Section 5 "Qualification of Personnel"** Inspection, test, and nondestructive examination personnel and laboratory technicians shall be trained and qualified/certified in accordance with *the applicable portions of Part 1, Basic* and Supplementary Requirements. Professional personnel shall meet the requirements defined by the implementing organization in its position descriptions.	Slightly different words, but same intent. NQA-1 does not require that auditors be qualified/certified as inspectors to monitor offsite inspection, examinations or testing.
2.5 Measuring and Test Equipment **2.5.1 Selection.** Inspection, examination, and testing equipment utilized to implement the requirements of this standard shall be selected to have accuracy and tolerance sufficient to determine conformance to specified requirements.	**Supplement 12S-1 "Supplementary Requirements for Control of Measuring and Test Equipment"** **Paragraph 2** Selection of measuring and test equipment shall be controlled to assure that such items are of proper type, range, accuracy, and tolerance to accomplish the function of determining conformance to specified requirements.	Slightly different words, but same intent.
2.5.2 Calibration and Control. As appropriate, measuring and test equipment shall be adjusted and calibrated at prescribed intervals against certified equipment having known valid relationships to nationally recognized standards.	**Supplement 12S-1 "Supplementary Requirements for Control of Measuring and Test Equipment"** **Paragraph 3.1** Measuring and test equipment shall be calibrated, adjusted and maintained at prescribed intervals or, prior to use, against certified equipment having known valid relationships to nationally recognized standards.	Slightly different words, but same intent.
If no national standards exists, the basis for calibration shall be documented.	**Supplement 12S-1 "Supplementary Requirements for Control of Measuring and Test Equipment"** **Paragraph 3.1** If no national recognized standards exists, the bases for calibration shall be documented.	NQA-1 includes the word "recognized"
Records shall be maintained and equipment suitably marked to indicate calibration status.	**Supplement 12S-1 "Supplementary Requirements for Control of Measuring and Test Equipment"**	OK

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	Paragraph 5 Records shall be maintained and equipment shall be suitably marked to indicate calibration status.	
2.6 Housekeeping In job-site areas, facilities, and environments where packaging, shipping, receiving, storage and handling of items is performed in accordance with the requirements of this standard, the housekeeping requirements shall be in accordance with N45.2.3.	NQA-1 Subpart 2.3 replaced N45.2.3.	QAPP Section 4.13 "Handling, Storage, and Shipping" establishes requirements for housekeeping via commitment to NQA-1-1994, Subpart 2.3.
2.7 Classification of Items The requirements for activities covered by this standard (packaging, shipping, receiving, storage and handling) are divided into four levels with respect to protective measures to prevent damage, deterioration or contamination of the items, based upon the important physical characteristics and not upon the important functional characteristic of the item with respect to safety, reliability and operation.	**2.2 Classification of Items** Requirements are divided into four levels with respect to protective measures to prevent damage, deterioration, or contamination of the items based upon the important physical characteristics, and not upon the important functional characteristics of the item with respect to safety, reliability, and operation.	OK
It should be recognized, however, that within the scope of each level there may be a range of controls and that *the detailed requirements for an item* are dependent on the importance of the item to safety or reliability.	It should be recognized, however, that within the scope of each level there may be a range of controls, and that *the detailed requirements for an item* are dependent on the importance of the item to safety reliability.	OK
For example, even though a reactor vessel and structural steel are classified as level D, the degree of protection and control over the reactor vessel should exceed that of the structural steel.	For example, even though a reactor vessel and structural steel are classified as Level D, the degree of protection and control over the reactor vessel should exceed that of the structural steel.	OK
Each of the specific items governed by this procedure (See Subsection 2.1 of this standard) shall be classified into one of these four levels by the buyer or the contractor.	Each of the specific items governed by Subpart 2.2 shall be classified into one of these four levels by the buyer or the contractor.	OK
The manufacturer's documented standard or minimum requirements shall be considered when classifying the items.	The manufacturer's documented standard or minimum requirements shall be considered when classifying the items.	OK
Items, once classified, shall be restricted to the level or higher for each of the packaging, shipping, receiving, storage and handling operations.	Items, once classified at a level, shall be restricted to that level or a higher level for each of the packaging, shipping, receiving, storage, and handling operations.	OK
Items shall not be classified according to the requirements of one level, then packaged, shipped, received, stored or handled according to a level of lower grade.		Implied by statement above.
Any package unit or assembly made up of items of different levels shall be classified to the highest level designated for any of the respective parts.	Any package unit or assembly made up of items of different levels shall be classified to the highest level designated for any of the respective items.	OK

Enclosure 4, Table 2
ANSI N45.2.2-1972 vs NQA-1-1994, Subpart 2.2

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
If the unit is disassembled, a level shall be indicated for each part.	If the unit is disassembled, a level shall be indicated for each part. Items covered by Subpart 2.2 shall be categorized under the following levels.	OK
When the unit cannot be physically disassembled, special rules are contained herein.		These words not included in NQA-1
Items covered by this standard shall be categorized under the following levels:	Items covered by Subpart 2.2 shall be categorized under the following levels.	OK
2.7.1 Level A Items classified to level A are those that are exceptionally sensitive to environmental conditions and require special measures for protection from one or more of the following effects: temperatures outside required limits, sudden temperature changes, humidity and vapors, gravitational (g) forces, physical damage and airborne contamination (e.g. rain, snow, dust, dirt, salt spray, fumes).	**2.2.1 Level A.** Items classified to Level A are those that are exceptionally sensitive to environmental conditions and require special measures for protection from one or more of the following effects: (a) temperatures outside required limits *(b)* sudden temperature changes (c) humidity and vapors *(d)* accelerating forces (e) physical damage (f) airborne contamination (e.g., rain, snow, dust, dirt, salt spray, fumes)	N45.2.2 uses the term "gravitational (g) forces" whereas NQA-1 uses the term "accelerating forces". Similar, Same Intent.
The following shall be used as a guide for classifying items intended for this level classification:	Types of items to be categorized under this classification level are:	OK
(1) Special electronic equipment and instrumentation.	*(a)* special electronic equipment and instrumentation	OK
(2) Special materials, such as chemicals that are sensitive to environment.	*(b)* special materials, such as chemicals, that are sensitive to environment	OK
(3) Special nuclear material (fuel) and sources. The requirements of the AEC fuel license and conditions and other governmental agencies shall be met.	(c) special nuclear material and sources. The requirements of the NRC fuel license and conditions and of other governmental agencies shall be met.	N45.2.2 uses the term "AEC fuel license" while NQA-1 uses the term "NRC fuel license". Similar, Same Intent.
2.7.2 Level B — Items classified to level B are those that are sensitive to environmental conditions and require measures for protection from the effects of temperature extremes, humidity and vapors, g forces, physical damage and airborne contamination and should not require special protection required for level A items.	**2.2.2 Level B.** Items classified to Level B are those that are sensitive to environmental conditions and require measures for protection from the effects of temperature extremes, humidity and vapors, accelerating forces, physical damage, and airborne contamination, and do not require special protection required for Level A items.	N45.2.2 uses the term "gravitational (g) forces" whereas NQA-1 uses the term "accelerating forces" Similar, Same Intent.
The following shall be used as a guide for classifying items intended for this level classification:	Types of items to be categorized under this classification level are:	OK
(1) Instrumentation (2) Electrical penetrations *(3)* Batteries (4) Welding electrode and wire (5) Control rod drives (6) Motor control centers, switchgear and control panels (7) Motors and generators (8) Precision machined parts (9) Erection spares, such as gaskets, "0" rings (10) Air handling filters (11) Computers	(a) instrumentation *(b)* electrical penetrations *(c)* batteries *(d)* welding electrode and wire (Welding electrodes hermetically sealed in metal containers may be stored under conditions described for Level C, unless other storage requirements are specified by the manufacturers.) (e) control rod drives *(f)* motor control centers, switchgear, and control panels (g) motors and generators *(h)* precision machine parts *(i)* spares, such as gaskets, 0-rings	NQA-1 adds the parenthesis (Welding electrodes hermetically sealed in metal containers may be stored under conditions described for Level C, unless other storage requirements are specified by the manufacturers.) after (d) and deletes the word "erection" before (j).

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	(j) air handling filters *(k)* computers	
2.7.3 Level C — Items classified to level C are those that require protection from exposure to the environment, airborne contaminants, g forces and physical damage. Protection from water vapor and condensation is not so important as that for Level B items.	**2.2.3 Level** C. Items classified to Level C are those that require protection from exposure to the environment, airborne contamination, acceleration forces, and physical damage. Protection from water vapor and condensation is not as important as for Level B items.	N45.2.2 uses the term "gravitational (g) forces" whereas NQA-1 uses the term "accelerating forces". Similar, Same Intent.
The following shall be used as a guide for classifying items intended for this level classification.	Types of items to be categorized under this classification level are:	OK
(1) Pumps (2) Valves (3) Fluid filters (4) Reactor internals (5) Compressors (6) Auxiliary Turbines (7) Instrument cable (8) Refueling equipment (9) Thermal insulation (10) Fans and blowers (11) Cement	*(a)* pumps *(b)* valves (c) fluid filters *(d)* reactor internals (e) compressors *(f)* auxiliary turbines (g) instrument cable (unjacketed) *(h)* refueling equipment *(i)* thermal insulation (j) fans and blowers *(k)* cement *(l)* fabricated fuel rods and assemblies	NQA-1 adds the parenthesis (unjacketed) after instrument cable in (g) and adds (l) fabricated fuel rods and assemblies which is not included in N45.2.2. Similar, Same Intent.
2.7.4 Level D — Items classified to level D are those that are less sensitive to the environment than level C. These items require protection against the elements airborn contamination, and physical damage.	**2.2.4 Level D.** Items classified to Level D are those that are less sensitive to the environment than those for Level C. These items require protection against the weather, acceleration forces, airborne contamination, and physical damage.	NQA-1 adds the words "acceleration forces" as what an item requires protection from. Similar, Same Intent.
The following shall be used as a guide for classifying items intended for this level classification.	Types of items to be categorized under this classification level are:	OK
(1) Tanks (2) Heat exchangers and parts (3) Accumulators (4) Demineralizers (5) Reactor vessel (6) Evaporators (7) Steam generators (8) Pressurizer (9) Piping (10) Electrical cable (11) Structural items (12) Reinforcing steel (13) Aggregates	*(a)* tanks *(b)* heat exchangers and parts (c) accumulators *(d)* demineralizers (e) reactor vessel *(f)* evaporators *(g)* steam generators *(h)* pressurizers *(i)* piping *(j)* electrical cable (jacketed) *(k)* structural items *(l)* reinforcing steel *(m)* aggregates	NQA-1 adds the parenthesis (jacketed) after electrical cable in (j). Similar, Same Intent.
3. PACKAGING **3.1 General** This section contains the requirements for packaging of items for protection against corrosion, contamination, physical damage or any effect which would lower the quality or cause the item to deteriorate during the time it is shipped, handled and stored.	**3 PACKAGING** **3.1 General** This Section contains the requirements for packaging of items for protection against corrosion, contamination, physical damage, or any effect that would lower the quality or cause the items to deteriorate during the time they are shipped, handled, and stored.	OK
The degree of protection specified will vary according to storage conditions and duration, shipping environment, and handling conditions.	The degree of protection specified will vary according to conditions and duration of storage, shipping environment, and handling conditions.	OK

Enclosure 4, Table 2
ANSI N45.2.2-1972 vs NQA-1-1994, Subpart 2.2

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
Implementation of this packaging section is accomplished by identifying the item and the appropriate packaging level, and then applying the appropriate criteria contained herein concerning cleaning, preservatives, desiccants, inert gas blankets, cushioning, caps and plugs, barrier and wrapping materials, tapes, blocking and bracing, containers, marking, other quality assurance provisions and documentation.	Implementation of this Section is accomplished by identifying the item and the appropriate packaging level, and then applying the appropriate criteria contained herein concerning cleaning, preservatives, desiccants, inert gas blankets, cushioning, caps and plugs, barrier and wrapping materials, tapes, blocking and bracing, containers, marking, other quality assurance provisions, and documentation.	OK
Appendix A-3 contains additional requirements generally not available in other documents.	Part II Introduction 1 Purpose Applicable nonmandatory guidance for various subparts are provided in Part III.	OK
These requirements are a mandatory part of this standard		These words not included in NQA-1 as the requirements are included in the text and not in a separate appendix.
3.2 Levels of Packaging The packaging requirements are based on the protection the items should receive during shipping, handling, and storage.	**3.2 Levels of Packaging** The packaging requirements shall be based on the protection that is necessary during shipping, handling, and storage of the item to satisfy Levels A, B, C, and D protection requirements set forth below.	OK
The requirements of this standard are intended to be in addition to industry classifications or tariff rules for rail, truck, air and water shipments and regulatory agency rules already established in the transportation industry and in no way are they intended to reduce the minimum standards established by these regulatory agency rules.	The requirements herein are intended to be in addition to industry classifications or tariff rules for rail, truck, air, and water shipments and regulatory agency rules already established in the transportation industry; and in no way are they intended to reduce the minimum standards established by these regulatory agency rules.	OK
The following packaging criteria are divided into four levels corresponding to the categories of Subsection 2.7 of this Standard.	The following packaging criteria are divided into four levels corresponding to the classification categories of para. 2.2 of Subpart 2.2.	OK
3.2.1 Level A Items. (See paragraph 2.7.1). Level A items require the highest degree of protection and shall conform to the following criteria:	**3.2.1 Level A Items.** (See para. 2.2.1.) Level A items require the highest degree of protection and shall conform to the following criteria.	OK
(1) Package design requirements are for extraordinary environmental protection to avoid the deleterious effects of shock and vibration, to control temperature or humidity within specified limits, or for any other special requirements.	*(a)* Package design requirements shall be for extraordinary environmental protection to avoid the deleterious effects of shock and vibration, to control temperature or humidity within specified limits, or for any other special requirements.	OK
(2) Items shall have been inspected for cleanness immediately before packaging. Dirt, oil residue, metal chips or other form of contamination shall have been removed by approved cleaning methods. Any entrapped water shall have been removed.	*(b)* Items shall have been inspected for cleanness immediately before packaging. Dirt, oil residue, metal chips, or other forms of contamination shall have been removed by approved cleaning methods. Any entrapped water shall have been removed.	OK
(3) Items which are not immediately packaged shall be protected from	(c) Items which are not immediately packaged shall be protected from	OK

Enclosure 4, Table 2
ANSI N45.2.2-1972 vs NQA-1-1994, Subpart 2.2

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
contamination.	contamination.	
(4) All items shall be packaged with a barrier (see Subsection 3.6 of this Standard) so that water vapor, salt air, dust, dirt and other forms of contamination do not penetrate the package.	*(d)* Items requiring protection from water vapor, salt air, dust, dirt, and other forms of contamination penetrating the package shall be packaged with a barrier (see para. 3.6).	OK
(5) Items shall be packaged in containers or crates (see Subsection 3.7 of this standard).	(e) Items which require protection from damage during shipping and handling shall be packaged in containers or crates (see para. 3.7).	NQA-1 adds the words "which require protection from damage during shipping and handling".
(6) Items which can be damaged by condensation trapped within the package shall be packaged with approved desiccant (see paragraph 3.6.3) inside the sealed water vapor proof barrier or by an equivalent method (for example, see paragraph 3.6.2).	*(f)* Items which can be damaged by condensation trapped within the package shall be packaged with approved desiccant (see para. 3.6.3) inside the sealed water- and vapor-proof barrier or by an equivalent method (for example, see para. 3.6.2).	OK
(7) All openings into items shall be capped, plugged or sealed (see Subsection 3.5 of this standard). Weld end preparations shall be protected against corrosion and physical damage.	*(g)* All openings into items shall be capped, plugged, or sealed (see para. 3.5). Weld end preparations shall be protected against corrosion and physical damage.	OK
(8) Items packed in containers shall be blocked, anchored, braced and/or cushioned (see Subsection 3.8 of this standard) to prevent physical damage to the item or barrier.)	*(h)* Items packed in containers shall be blocked, anchored, braced, or cushioned (see para. 3.8) to prevent physical damage to the item or barrier.	N45.2.2 uses the words "and/or" whereas NQA-1 uses the words "or". Similar, Same Intent.
(9) Items and their containers shall be identified by marking (see Subsection 3.9 of this standard).	*(i)* Items and their container shall be identified by marking (see para. 3.9).	OK
3 2.2 Level B Items. (See paragraph 2.7.2) Level B items require a high degree of protection and the package shall be designed to avoid the deleterious effects of shock, vibration, physical damage, water vapor, salt spray, condensation and weather during shipping, handling and storage.	**3.2.2 Level B Items.** (See para. 2.2.2.) Level B items require a high degree of protection, and the package shall be designed to avoid the deleterious effects of shock, vibration, physical damage, water vapor, salt spray, condensation, and weather during shipping, handling, and storage.	OK
This packaging shall be equivalent to that for Level A except that the extremes of paragraph 3.2.1 (1) need not apply.	This packaging shall be equivalent to that for Level A, except that the package design requirements need not be equivalent to satisfy the level of extraordinary environmental protection indicated in para. 3.2.1(a) where such protection is not justified.	Slightly different wording between N45.2.2 and NQA-1 but equivalent.
Level B items such as control panels or similar special items may be shipped with a minimum of protection when transported in a fully enclosed furniture type van with special suspension, provided the shipment goes through to destination in the original vehicle and Level B storage facilities are available at the site.	Shipment of Level B items in fully enclosed vehicles or equivalent protective enclosure or packaging is acceptable, provided the above-stated high degree of protection for Level B items is maintained throughout shipment, and the shipment goes through to destination in the original vehicle and Level B storage facilities are available on site.	N45.2.2 includes the words "such as control panels or other similar special items" and is more specific in describing the transportation manner as "furniture type van with special suspension".
	If transfer becomes necessary to transit, transfer procedures shall be subject to purchaser acceptance.	These words not included in N45.2.2.
3.2.3 Level C Items. (See paragraph 2.7.3) Level C items require protection from exposure to salt spray, rain, dust, dirt, and other airborne and windblown contaminants. Protection from water	**3.2.3 Level C Items.** (See para. 2.2.3.) Level C items require protection from exposure to salt spray, rain, dust, dirt, and other contaminants. Protection from water vapor and	N45.2.2 adds the words "airborne and windblown" when referring to contaminants.

Enclosure 4, Table 2
ANSI N45.2.2-1972 vs NQA-1-1994, Subpart 2.2

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
vapor and condensation is less important than for Level B items. The following criteria shall apply:	condensation is less important than for Level B items. The following criteria shall apply.	
(1) Criteria (2) (3) (5) (7) (8) and (9) for Level A items (see paragraph 3.2.1) shall apply to Level C items.	*(a)* Criteria (b), (c), (e), (g), (h), and (i) for Level A items (see para. 3.2.1) shall apply to Level C items.	OK
(2) Items shall be packaged with a waterproof enclosure so that water, salt spray, dust, dirt, and other forms of contamination do not penetrate to the item.	*(b)* Items shall be packaged with a waterproof enclosure so that water, salt spray, dust, dirt, and other forms of contamination do not penetrate to the item.	OK
(3) Items subject to detrimental corrosion, either internal or external, shall be suitably protected.	(c) Items subject to detrimental corrosion, either internal or external, shall be suitably protected.	OK
3.2.4 Level D Items. (See paragraph 2.7.4) Level D items require protection from physical and mechanical damage. The following criteria shall apply:	**3.2.4 Level D Items.** (See para. 2.2.4.) Level D items require protection from physical and mechanical damage. The following criteria shall apply.	OK
(1) Items, just before packaging, shall have been inspected for cleanness according to the requirements specified in the purchasing document. Dirt, oil residue, metal chips or other forms of contamination shall have been removed by approved cleaning methods. Any entrapped water shall have been removed.	*(a)* Items, just before packaging, shall have been inspected for cleanness according to the requirements specified in the purchasing document. Dirt, oil residue, metal chips, or other forms of contamination shall have been removed by approved cleaning methods. Any entrapped water shall have been removed.	OK
(2) All openings into items shall be capped, plugged and sealed (see Subsection *3.5* of this standard). Weld end preparations shall be protected from corrosion and physical damage.	*(b)* All openings into items shall be capped, plugged, and sealed (see para. 3.5). Weld end preparations shall be protected from corrosion and physical damage.	OK
(3) Items subject to detrimental corrosion, either internal or external, shall be suitably protected.	(c) Items subject to detrimental contamination or corrosion, either internal or external, shall be suitably protected.	OK
(4) Items packed in containers shall be blocked, braced and/or cushioned to prevent physical damage (see Subsection 3.8 of this Standard).	*(d)* Items packed in containers shall be blocked, braced, or cushioned to prevent damage (see para. 3.8).	OK
(5) Items such as aggregate and reinforcing steel shall be suitably protected against detrimental contamination or corrosion.	(c) Items subject to detrimental contamination or corrosion, either internal or external, shall be suitably protected.	These specific words related to aggregates and reinforcing steel are not included as a separate item since item (c) of this section includes this provision as a general requirement.
(6) The identity of the item shall be maintained by marking (see Subsection 3.9 of this standard) or other appropriate means.	(e) The identity of the item shall be maintained by marking (see para. 3.9) or other appropriate means.	OK
Cleaning Cleaning includes the preparation of items for preservation or packaging, or both, to minimize the requirements for site cleaning. Items shall be inspected for cleanness immediately before packaging according to the cleaning requirements specified in the purchase document. Any dirt, oil residue, metal chips or other forms of contamination shall be removed by documented cleaning methods. Any entrapped water shall be removed.	**3.3 Cleaning** Cleaning includes the preparation of items for preservation or packaging, or both, to minimize the requirements for site cleaning. Items shall be inspected for cleanness immediately before packaging according to the cleaning requirements specified in the procurement documents. Any dirt, oil residue, metal chips, or other forms of contamination shall be removed by documented cleaning methods. Any entrapped water shall be removed.	N45.2.2 uses the word "purchase document" whereas NQA-1 uses the word "procurement document"

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
Any item which is not immediately packaged shall be protected from further contamination. (See Appendix section A3.3 for additional requirements.)	(d) After cleaning, the item shall be protected from contamination until preservation or packaging is complete.	OK
Methods of Preservation Items subject to deleterious corrosion shall be protected by using either contact preservatives, inert gas blankets, or vaporproof barriers with desiccants. (See Subsection 3.6 of this standard for vaporproof barriers and desiccants.)	**3.4 Methods of Preservation** Items subject to deleterious corrosion shall be protected by using either contact preservatives, inert gas blankets, or vapor-proof barriers with desiccants. (See para. 3.6 for vapor-proof barriers and desiccants.)	OK
3.4.1 Contact Preservatives. Contact preservatives are compounds applied to bare metal surfaces to prevent surface corrosion during shipping and storage and generally require removal prior to installation. (See Appendix section A3.4.1 for additional requirements.)	**3.4.1 Contact Preservatives.** Contact preservatives are compounds applied to bare metal surfaces to prevent surface corrosion during shipping and storage and generally require removal prior to installation.	OK
3.4.2 Inert Gas Blankets. Purging and pressurizing the interior of an item or its container or both with a dry inert gas provides a means of preventing moisture or corrosive atmospheres from acting on sensitive bare metal surfaces or other materials. The item or its container shall be either *evacuated prior to filling with the inert* gas or adequately purged with the same gas prior to applying the gas blanket. (See Appendix section A3.4.2 for additional requirements.)	**3.4.2 Inert Gas Blankets.** Purging and pressurizing the interior of an item or its container, or both, with a dry inert gas provides a means of preventing moisture or corrosive atmospheres from acting on sensitive, bare metal surfaces or other materials. The item or its container shall be either *evacuated prior to filling with the inert* gas or adequately purged with the same gas prior to applying the gas blanket.	OK
Caps, Plugs, Tapes, and Adhesives These items shall be of materials which enable them to perform their intended function adequately without causing deleterious effects on items or systems operation.	**3.5 Caps, Plugs, Tapes, and Adhesives** These items shall be of materials that enable them to perform their intended function adequately, without causing deleterious effects on the items or system operation.	OK
3.5.1 Caps and Plugs. Caps and plugs shall be used to seal openings in items having sensitive internal surfaces, and to protect threads and weld end preparations. (See Appendix section A3.5.1 for additional requirements.)	**3.5.1 Caps and Plugs.** Caps and plugs shall be used to seal openings in items having sensitive internal surfaces and to protect threads and weld end preparations.	OK
3.5.2 Tapes and Adhesives. Pressure sensitive, removable, tape should be used in lieu of adhesives in contact with bare metal surfaces.	**3.5.2 Tapes and Adhesives.** Pressure-sensitive, removable tape shall be used in lieu of adhesives in contact with bare metal surfaces.	OK
Tapes or adhesives which could have damaging effects on the item or system shall not be used. Tapes near a weld shall be removed completely immediately prior to performing a weld or closure.	Tapes or adhesives that could have damaging effects on the item or system shall not be used. Tapes near a weld shall be removed completely, immediately prior to performing a weld.	OK
Tapes used for identification rather than sealing which are not near a	Tapes used for identification rather than sealing that are not near a	OK

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
welding operation may remain until system testing. (See Appendix section A3.5.2 for additional requirements.)	welding operation may remain until system testing is complete, but shall be removed before plant operations unless qualified for operating conditions.	
Barrier and Wrap Materials and Desiccants A barrier generally is a flexible material designed to withstand the penetration of water, water vapor, grease, or harmful gases. A wrap is a flexible material, formed around the item or package to exclude dirt and to facilitate handling, marking or labeling.	**1.1 Definitions** *barrier* — a flexible material designed to withstand the penetration of water, water vapor, grease, or harmful gases *wrap* — a flexible material formed around the item or package to exclude dirt and to facilitate handling, marking, or labeling	OK
Material thickness shall be selected on the basis of type, size and weight of equipment or item to be protected, such that the barrier or wrap will not easily be damaged by puncture, abrasion, weathering, cracking, temperature extremes, wind conditions, and the like.	**3.6 Barrier and Wrap Materials and Desiccants** Material thickness shall be selected on the basis of type, size, and weight of equipment or item to be protected, such that the barrier or wrap will not easily be damaged by puncture, abrasion, weathering, cracking, temperature extremes, wind conditions, and the like.	OK
Barrier and wrap materials shall be nonhalogenated when used in direct contact with austenitic stainless steels, shall be noncorrosive, shall not readily support combustion and shall not be otherwise harmful to the item packaged.	Barrier and wrap materials shall be noncorrosive and shall not be otherwise harmful to the item packaged. When barrier and wrap materials are used in direct contact with austenitic stainless steels, the total and water leachable content of halogen shall not be harmful to the item packaged. Also, barrier and wrap materials shall not readily support combustion.	OK
Vaporproof barrier materials used with desiccants constitutes another preservation system (see Subsection 3.4 of this standard); it protects against potential damage by water vapor condensate.	Vapor-proof barrier materials used with desiccants constitute another preservation system that protects against potential damage by water vapor condensate.	OK
3.6.1 Water-proof Barrier Material. Waterproof barrier material shall be resistant to grease and water: it shall protect items from airborne and windblown soils.	**3.6.1 Waterproof Barrier Material.** Waterproof barrier material shall be resistant to grease and water; it shall protect items from airborne and windblown soils.	OK
3.6.2 Vapor Barrier Material. Vaporproof barrier materials shall be sealable and the edge of the barrier which normally will be opened at destination shall be of sufficient area to permit at least two subsequent sealing operations. (See Appendix A3.6.2 for additional requirements).	**3.6.2 Vapor-proof Barrier Material.** Vapor-proof barrier materials shall be sealable, and the edge of the barrier that normally will be opened at destination shall be of sufficient area to permit at least two subsequent sealing operations.	OK
3.6.3 Desiccants. Desiccants may be used within a vaporproof barrier when condensation or high humidity could damage an item by corrosion, mold, or mildew. (See Appendix A3.6.3 for additional requirements).	**3.6.3 Desiccants.** Desiccants shall be used within a vapor-proof barrier when condensation or high humidity could damage an item by corrosion, mold, or mildew.	OK
3.7 Containers, Crating and Skids	**3.7 Containers, Crating, and Skids**	OK
3.7.1 Containers. Containers are	**3.7.1 Containers.** Containers shall	OK

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
used when maximum protection for the item or its barrier is required. Domestic types used shall be limited to:	be used when maximum protection for the item or its barrier is required. Domestic types used shall be limited to the following:	
(1) Cleated, sheathed boxes (500 lb maximum net weight).	*(a)* cleated, sheathed boxes [500 lb (227 kg) maximum net weight]	NQA-1 also references metric weight equivalents.
(2) Nailed wood boxes.	*(b)* nailed wood boxes	OK
(3) Wood-cleated solid fiberboard boxes.	(c) wood-cleated solid fiberboard boxes	OK
(5) Metal or fiber drums.	*(d)* metal or fiber drums	OK
(6) Crates (see paragraph 3.7.2).	(e) crates (see para. 3.7.2)	OK
(7) Wire bound boxes (200 lb maximum net weight).	*(f)* wire bound boxes [200 lb (91 kg) maximum net weight]	NQA-1 also references metric weight equivalents.
(8) Other specially designed containers for special equipment.	*(g)* other specially designed containers for special equipment	OK
(4) Fiberboard boxes (120 lb maximum net weight. See Appendix A3.7.1 for additional requirements).	*(h)* fiberboard boxes [120 lb (54.5 kg) maximum net weight].	NQA-1 also references metric weight equivalents.
Cleated boxes in excess of 50 lb shall be bound with steel strapping or equivalent around the container at not less than two places. (See Appendix A3.7.1 for additional requirements.)	Cleated boxes in excess of 50 lb (22.7 kg) shall be bound with steel strapping, or equivalent, around the container at not less than two places.	NQA-1 also references metric weight equivalents.
3.7.2 Crates and Skids. Crates and skids shall be used for equipment in excess of 500 lb. Skids and runners shall be used on boxes with a gross weight of 100 lb or more, allowing a minimum floor clearance for forklift tines as provided by 4 inch lumber.	**3.7.2 Crates and Skids.** Crates and skids shall be used for equipment in excess of 500 lb (227 kg). Skids and runners shall be used on boxes with a gross weight of 100 lb (45.5 kg) or more, allowing a minimum floor clearance for forklift tines as provided by 4 in. (10 cm) lumber.	NQA-1 also references metric weight equivalents.
3.8 Cushioning, Blocking, Bracing and Anchoring	**3.8 Cushioning, Blocking, Bracing, and Anchoring**	OK
3.8.1 Cushioning. Cushioning shall be used where protection from shock and vibration is required; the cushioning materials shall have sufficient strength to perform this function. (See Appendix A3.8.I for additional requirements.)	**3.8.1 Cushioning.** Cushioning shall be used where protection from shock and vibration is required. The cushioning materials shall have sufficient strength to perform this function.	OK
3.8.2 Blocking and Bracing. Blocking and bracing used for protection of the load to be supported, shall be compatible with the size, shape, and strength of bearing areas of the shipment.	**3.8.2 Blocking and Bracing.** Blocking and bracing used for protection of the load to be supported shall be compatible with the size, shape, and strength of bearing areas of the shipment.	OK
The blocking and bracing used to prevent item movement shall withstand thrust and impact applied in any direction.	The blocking and bracing used to prevent item movement shall withstand thrust and impact applied in any direction.	OK
Blocking and bracing used in direct contact with the item being blocked shall not have a corrosive effect on the item.	Blocking and bracing used in direct contact with the item being blocked shall not have a corrosive effect on the item.	OK
3.8.3 Anchoring. Anchoring of the item within a crate or on a skid shall adequately fasten the item during *shipment and protect the item from* potential damage due to rough handling.	**3.8.3 Anchoring.** Anchoring of the item within a crate or on a skid shall adequately fasten the item during *shipment and protect the item from* potential damage due to rough handling.	OK
To facilitate disassembly and minimize damage when removing container contents, bolting is preferred. (See Appendix A3.8.3 for additional requirements.)		Guidance only. Does not establish requirements.

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
Temporary cushioning, blocking, bracing or anchoring placed within an item for shipping protection that must be removed prior to operation of the item shall be identified by warnings placed in a conspicuous manner to effect proper removal of the packing material.	Temporary cushioning, blocking, bracing, or anchoring placed on an item for shipping protection that needs to be removed prior to operation of the item shall be identified by warnings placed in a conspicuous manner to effect proper removal of the packing material.	OK
3.9 Marking To maintain proper identification and instructions or both during shipping, receiving and storage, and to provide for identification after the outside of the container has been removed, the item and the outside of containers shall be marked. (See Appendix *3.9* for additional requirements.)	**3.9 Marking** To maintain proper identification and instructions, or both, during shipping, receiving, and storage and to provide for identification after the outside of the container has been removed, the item and the outside of the containers shall be marked.	OK
	If equipment does not lend itself to marking, records shall be maintained that are uniquely identifiable to the item.	Words not included in N45.2.2
4. SHIPPING **4.1 General** This section covers the requirements for loading and shipment of items as defined in Subsection 2.7 of this standard. Described are environmental protection during transit, procedures to minimize damage in transit, precaution required when handling items during loading and transit, and identification and inspection on overseas shipments.	**4.1 General** This Section covers the requirements for loading and shipment of items as defined in para. 2.2.	N45.2.2 goes into details as to what is covered under this section.
The mode of transportation used shall be consistent with the protection classification of the item (see Subsection 2.7 of this standard) and with the packaging methods employed (see Subsection 3.2 of this standard).	The mode of transportation used shall be consistent with the protection classification of the item (see para. 2.1) and with the packaging methods employed (see para. 3.2).	OK
4.2 Transportation Requirements	**4.2 Transportation Requirements**	OK
4.2.1 Open Carriers. For shipment on open carriers where items may be exposed to adverse environmental conditions, the following shall apply:	**4.2.1 Open Carriers.** For shipment on open carriers where items may be exposed to adverse environmental conditions, the following shall apply.	OK
(1) Level A, B, and C items shall be covered for protection from environmental conditions. Tarpaulins, when used, shall be fire retardant; and they shall be installed in a manner to provide drainage and to insure air circulation to prevent condensation.	*(a)* Levels A, B, and C items shall be covered for protection from environmental conditions. Tarpaulins, when used, shall be fire retardant, and they shall be installed in a manner to provide drainage and to ensure air circulation to prevent condensation.	OK
(2) Barrier and wrapping materials (see Subsection 3.6 of this standard) subject to transportation damage shall be covered with waterproof shrouds such as tarpaulins, so that they are not exposed directly to the environment.	*(b)* Barrier and wrapped materials (see para. 3.6) subject to transportation damage shall be covered with waterproof shrouds, such as tarpaulins, so that they are not exposed directly to the environment.	OK
4.2.2 Closed Carriers. For shipment on closed carriers the following shall	**4.2.2 Closed Carriers.** For shipment on closed carriers the following shall	OK

Enclosure 4, Table 2
ANSI N45.2.2-1972 vs NQA-1-1994, Subpart 2.2

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
apply:	apply.	
(1) When level A, B, and C items cannot be adequately protected from weather or environment on open carriers, closed carriers shall be used.	When Levels A, B, and C items cannot be adequately protected from weather or environment on open carriers, closed carriers or fully enclosed vehicles shall be used.	OK
(2) Use of fully enclosed furniture vans is recommended when shipping large delicate items such as control panels.		Recommendation only. Does not establish requirements.
4.2.3 Special Shipments. Items that exceed established weight or size limitations for railroads or highways, or require special handling should be given additional consideration in the following areas:	**4.2.3 Special Shipments.** Items that exceed established weight or size limitations for railroads or high ways or require special handling shall be given additional consideration in the following areas.	OK
(1) The type of bracing and tie down methods to be used with the mode of transportation selected for special shipments shall be specified.	*(a)* The type of bracing and tie down methods to be used with the mode of transportation selected for special shipments shall be specified.	OK
(2) "NO HUMPING" shall be specified on rail shipments of these items, and "NO HUMPING" signs shall be prominently displayed.	*(b)* NO HUMPING shall be specified on rail shipments of these items, and NO HUMPING signs shall be prominently displayed.	OK
(3) Use of impact recording meters should be specified on shipments of heavy or relatively large items incorporating delicate factory installed instrumentation. Meters, when specified, shall be installed prior to loading (to record any rough handling during loading). Procedures shall be established to interpret recorded data, and to thoroughly check the integrity of an item when there is evidence of rough handling. A notice that impact recording meters are being used shall be prominently displayed. Special recording meters with operating time limits greater than the expected transit time shall be specified or, if the expected transit time exceeds the operating time limit of the recorders being used, provisions shall be made to service the meters during transit.	(c) Use of impact recording meters shall be specified on shipments of heavy or relatively large items incorporating delicate factory-installed instrumentation. Meters, when specified, shall be installed prior to loading (to record any rough handling during loading). Procedures shall be established to interpret recorded data and to thoroughly check the integrity of an item when there is evidence of rough handling. A notice that impact recording meters are being used shall be prominently displayed. Special recording meters with operating time limits greater than the expected transit time shall be specified or, if the expected transit time exceeds the operating time limit of the recorders being used, provisions shall be made to service the meters during transit.	OK
(4) The use of "Escorts" may be specified to accompany shipments, when additional surveillance is required during transit of certain items.		These words are not contained in NQA-1. "May" establishes a recommendation, not a requirement.
(5) For special shipments, the conveyance used for transport shall be certified to be structurally adequate to take the loads imposed during loading, while en route, and during unloading. Prior to shipment the route shall have been investigated to assure safe transit.	*(d)* For special shipments, the conveyance used for transport shall be certified to be structurally adequate to take the loads imposed during loading, while en route, and during unloading. Prior to shipment the route shall have been investigated to assure safe transit.	OK
4.3 Precautions During Loading and Transit	**4.3 Precautions During Loading and Transit**	OK
4.3.1 Loading. The weight, lifting points, or center of gravity indicated on the crate, skid, or package by the shipper (see Subsection 3.9 of this standard) shall be utilized to insure	**4.3.1 Loading.** The weight, lifting points, or center of gravity indicated by the shipper on the crate, skid, or package by the shipper (see para. 3.9) shall be utilized to ensure proper	NQA-1 includes the words "by the shipper" when referring to indicating the weight, etc.

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
proper handling during loading, transfer between carriers, and un-loading (see Section 7 of this standard).	handling during loading, transfer between carriers, and unloading (see Section 7).	
4.3.2 Rigging. Carbon steel rigging equipment shall not come in direct contact with stainless steel except when attached to lifting lugs, eyes, or pads, in order to avoid surface damage.	**4.3.2 Rigging.** Carbon steel rigging equipment shall not come in direct contact with stainless steel, except when attached to lifting lugs, eyes, or pads in order to avoid surface damage.	OK
4.3.3 Handling Precautions. All austenitic stainless steel and nickel base alloy materials shall be handled in such a manner that they are not in contact with lead, zinc, copper, mercury, or other low melting elements, alloys, or halogenated material.	**4.3.3 Handling Precautions.** All austenitic stainless steel and nickel-base alloy materials shall be handled in such a manner that they are not in contact with lead, zinc, copper, mercury, or other low melting point elements, alloys, or halogenated material.	OK
4.3.4 Package/Preservative Coatings. Packages and/or preservative coatings shall be visually inspected after loading, and damaged areas repaired prior to shipment.	**4.3.4 Package and Preservative Coatings.** Package or preservative coatings shall be visually inspected after loading and damaged areas repaired prior to shipment.	N45.2.2 uses and/or when referring to" packages and/or preservative coatings", NQA-1 uses the word "or".
Items shipped with desiccants shall be inspected after loading to assure that sealed areas are intact.	Items shipped with desiccants shall be inspected after loading to assure that sealed areas are intact.	OK
4.3.5 Sealed Openings. Sealed Openings shall be visually inspected after loading to assure closures are intact. Materials used for resealing shall be in accordance with Section 3 of this standard.	**4.3.5 Sealed Openings.** Sealed openings shall be visually inspected after loading to assure closures are intact. Materials used for resealing shall be in accordance with Section 3.	OK
4.3.6 Stacking. Written instructions covering the location and stacking limits of the crates or boxes on the transport vehicle shall be specified; these should be marked on the container.	**4.3.6 Stacking.** Where special care is deemed necessary to avert damage, written instructions concerning the location or stacking limits for crates or boxes shall be marked on the containers.	NQA-1 includes the words "Where special care is deemed necessary to avert damage", whereas N45.2 includes the words "on the transport vehicle" when referring to limits of the crates or boxes.
4.3.7 Theft and Vandalism. Precautions shall be taken to minimize the possibility of theft and vandalism during shipment of items.	**4.3.7 Theft and Vandalism.** Precautions shall be taken to minimize the possibility of theft and vandalism during shipment of items.	OK
4.4 Identification and Marking Identification and markings on the outside of all packages, skids or protective covering shall be maintained in accordance with Subsection 3.9 of this standard.	**4.4 Identification and Markings** Identification and markings on the outside of all packages, skids, or protective covering shall be maintained.	N45.2.2 includes the words "in accordance with Subsection 3.9 of this standard."
4.5 Shipments From Countries Outside United States	**4.5 Shipments From Countries Outside the United States**	OK
4.5.1 Overseas Shipment. When overseas shipments are involved, use of deck cargo facilities shall be avoided unless necessary due to physical dimensions. Shipments utilizing approved watertight containers may be carried on deck.	**4.5.1 Overseas Shipment.** When overseas shipments are involved, use of deck cargo facilities shall be avoided unless necessary due to physical dimensions. Shipments utilizing approved watertight containers may be carried on deck.	OK
4.5.2 Inspection at Point of Shipment. For special shipments, items shall be inspected to insure integrity of packaging or protective enclosures after being loaded aboard ship.	**4.5.2 Inspections at Point of Shipment.** Items shall be inspected to ensure integrity of packaging or protective enclosures after being loaded aboard ship.	N45.2.2 uses the terminology "For special shipments". NQA-1 is more conservative. OK
4.5.3 Inspection at Port of Entry. For special shipments, items shall be	**4.5.3 Inspection at Port of Entry.** Items shall be inspected to ensure	N45.2.2 uses the terminology "For special shipments". " NQA-1 is more

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
inspected to insure integrity of packaging or protective enclosures when items are off loaded at the port of entry.	integrity of packaging or protective enclosures when items are off-loaded at the port of entry.	conservative. OK
4.5.4 Identification and Markings. Identification and markings shall follow the procedure outlined in Subsection 3.9 of this Standard.	**4.5.4 Identification and Markings.** Identification and markings shall follow the procedure outlined in para. 3.9.	OK
The English language and avoirdupois weight shall be used for all identification and marking. Duplicate markings and identification in other languages or weight systems may be used.		These words are not included in NQA-1.
4.5.5 *Transportation* Requirements. Requirements outlined in Subsection 4.2 (Transportation) and in Section 7 of this Standard shall be followed where applicable.	**4.5.5 *Transportation* Requirements.** Requirements outlined in para. 4.2 and Section 7 shall be followed where applicable.	OK
4.6 Nuclear Material Shipments Special nuclear material and sources shall be shipped as specified in the AEC fuel license and by other regulatory agencies.	**4.6 Nuclear Material Shipments** Special nuclear material and sources shall be shipped as specified in the NRC fuel license and by other regulatory agencies.	N45.2.2 uses the term "AEC fuel license" while NQA-1 uses the term "NRC fuel license". Similar, Same Intent.
5. RECEIVING **5.1 General** This section contains requirements that are to be fulfilled by the organization or organizations responsible for the receiving of items.	**5 RECEIVING** **5.1 General** The requirements that shall be fulfilled by the organization(s) responsible for the receiving of items.	OK
Receiving starts when the items arrive at a storage facility or construction site before unloading or unpacking.	Receiving starts when the items arrive at a storage facility or construction site before unloading or unpacking.	OK
Included are procedures, inspections, marking, identification and documentation prior to placing the item in storage or directly in its final location. Shipping damage claims, transfer of ownership, financial responsibility and contractual obligations are commercial obligations which are not included in the scope of this Standard.		Guidance only. Does not establish requirements.
5.2 Receiving Inspection Requirements	**5.2 Receiving Inspection Requirements**	OK
5.2.1 Shipping Damage Inspection. Preliminary visual inspection or examination shall be performed prior to unloading to determine if any damage occurred during shipping. Observations for unusual conditions shall include:	**5.2.1 Shipping Damage Inspection.** Preliminary visual inspection shall be performed prior to or immediately after unloading to determine if any damage occurred during shipping. Observations for unusual conditions shall include:	OK
(1) *Fire* — Charred paper, wood or paint, indicating exposure to fire or high temperature.	*(a)* fire — charred paper, wood, or paint, indicating exposure to fire or high temperature;	OK
(2) *Excessive Exposure* — Weather-beaten, frayed, rusted, or stained containers indicating prolonged exposure during transit.	*(b)* excessive exposure — weather-beaten, frayed, rusted, or stained containers, indicating prolonged exposure during transit;	OK
(3) *Environmental Damage* — Water or oil marks, damp conditions, dirty areas, or salt film (indicating	(c) environmental damage — water or oil marks, damp conditions, dirty areas, or salt film, indicating exposure	OK

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
exposure to sea water or winter road salt chemicals).	to sea water or winter road salt chemicals;	
(4) *Tie Down Failure* Shifted, broken, loose or twisted shipping ties, and worn material under ties, indicating improper blocking and tie down during shipment.	*(d)* tie down failure — shifted, broken, loose, or twisted shipping ties, and worn material under ties indicating improper blocking and tie down during shipment;	OK
(5) Rough Handling — Splintered, torn, or crushed containers indicating improper handling.	(e) rough handling — splintered, torn, or crushed containers, indicating improper handling;	OK
Review of impact recording instrument readings.	*(f)* review of impact recording instrument readings against established criteria. See para. 4.2.3(c).	NQA-1 adds the words "against established criteria."
5.2.2 Item Inspection. Unless the package marking prohibits unpacking, the content of all shipments shall be visually inspected to verify that the specified packaging and shipping requirements have been maintained.	**5.2.2 Item Inspection.** Unless the package marking prohibits unpacking, the contents of all shipments shall be visually inspected to verify that the specified packaging and shipping requirements have been maintained.	OK
When items are contained in transparent separate moisture-proof bags or envelopes, visual inspection without unpacking the contents is acceptable.	When items are contained in transparent, separate moisture-proof bags or envelopes, visual inspection without unpacking the contents shall be acceptable.	OK
Statistical sampling methods may be used for groups of similar items.	Where specific inspection requirements can be achieved, statistical sampling methods may be used for groups of similar items.	NQA-1 adds the words "Where specific inspection requirements can be achieved"
Care shall be taken to avoid contamination of the items during inspection. The inspections shall be performed in an area equivalent to the level of storage requirement for the item (see Section 6 of this standard).	Care shall be taken to avoid contamination of the items during inspection. The inspections shall be performed in an area equivalent to the level of storage requirement for the item (see Section 6).	OK
These inspections and examinations shall include the following as appropriate:	These inspections and examinations shall include the following, as appropriate:	OK
(1) *Identification and Marking.* Verification that identification and markings are in accordance with applicable codes, specifications, purchase orders, drawings, and this standard.	*(a)* identification and marking — verification that identification and markings are in accordance with applicable codes, specifications, purchase orders, and drawings, and with requirements in this Part (Part II);	OK
(2) *Manufacturing Documentation* — Assurance that the item received was fabricated, tested and inspected prior to shipment in accordance with applicable code, specification, purchase order and/or drawings.	*(b)* manufacturing documentations — assurance that the item received was fabricated, tested, and inspected prior to shipment in accordance with applicable code, specification, purchase order, or drawings;	N45.2.2 uses the term "and/or drawings", NQA-1 states "or drawings". Similar, Same Intent.
(3) *Protection Covers and Seals* — Visual inspection to assure that covers and seals meet their intended function.	(c) protective covers and seals — visual inspection to assure that covers and seals meet their intended function;	OK
(4) *Coatings and Preservatives* — Verification that coatings and preservatives are applied in accordance with specifications, purchase orders, or manufacturer's instructions.	*(d)* coatings and preservatives verification that coatings and preservatives are applied in accordance with specifications, purchase orders, or manufacturer's instructions;	OK
(5) Inert Gas Blanket — Verification that the inert gas blanket pressure is within the acceptable limits.	(e) inert gas blanket — verification that the inert gas blanket pressure is within the acceptable limits;	OK
(6) Desiccant — Verification that the desiccant is not saturated, as indicated through the use of humidity indicators. Desiccants shall be regenerated or	*(f)* desiccant — verification that the desiccant is not saturated, as indicated, through the use of humidity indicators. Desiccants shall be	OK

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
replaced as necessary in accordance with special instructions.	regenerated or replaced as necessary in accordance with special instructions.	
(7) *Physical Damage - Visual* inspection to assure that parts of items *are not broken, cracked, missing,* deformed or misaligned and rotating parts turn without binding. Accessible internal and external areas shall be free of detrimental gouges, dents, scratches and burns.	*(g)* physical damage — visual inspection to assure that parts of items *are not broken, cracked, missing,* deformed, or misaligned, and that rotating parts turn without binding. Accessible internal and external areas shall be free of detrimental gouges, dents, scratches, and burrs.	OK
(8) *Cleanness* — Visual inspection to assure that accessible internal and external areas are within the specification requirements for dirt, soil, mill scale, weld splatter, oil, grease, or stains. If inspection for cleanness was performed prior to sealing and shipping and inspection upon receipt indicates that there has been no penetration of the sealed boundary, then inspection for internal cleanness is optional.	*(h)* cleanness — visual inspection to assure that accessible internal and external areas are within the specification requirements for dirt, soil, mill scale, weld splatter, oil, grease, or stains. If inspection for cleanness was performed prior to sealing and shipping, and inspection upon receipt indicates that there has been no penetration of the sealed boundary, then inspection for internal cleanness is optional.	OK
Unless the completed item was inspected or examined at the source, it shall be inspected or examined at the point of receiving to verify that the following characteristics conform to the specified requirements.	Unless the completed item was inspected at the source, it shall be inspected at the point of receiving to verify that the following characteristics conform to the specified requirements.	N45.2 adds the words "or examined" OK
These inspections or examinations shall include such items as:	These inspections shall include such items as:	OK
(1) *Physical Properties* — Assurance that physical properties conform to the specified requirements and that chemical and physical test reports, if required, meet the requirements.	*(a)* physical properties — assurance that physical properties conform to the specified requirements and that chemical and physical test reports, if required, meet the requirements;	OK
(2) *Dimensions* — Random visual inspection to assure that important dimensions conform with drawings and specifications. Examples are: base plate mounting holes, overall external size, configuration and orientation of parts.	*(b)* dimensions — random visual inspection to as sure that important dimensions conform with drawings and specifications, i.e., baseplate mounting holes, overall external size, and configuration and orientation of parts;	OK
(3) *Weld Preparations* — Random verification that weld preparations are in accordance with applicable drawings and specifications.	(c) weld preparations — random verification that weld preparations are in accordance with applicable drawings and specifications;	OK
(4) *Workmanship* — Visual inspection of accessible areas to assure that the workmanship is satisfactory to meet the intent of the requirements.	*(d)* workmanship — visual inspection of accessible areas to assure that the workmanship is satisfactory to meet the intent of the requirements;	OK
(5) *Lubricants and Oils* — Verification of presence of proper lubricants and oils, if required by either specification, purchase order, or manufacturers' instructions.	(e) lubricants and oils — verification of presence of proper lubricants and oils, if required, by either specification, purchase order, or manufacturer's instructions;	OK
(6) Electrical Insulation — Performance of insulation resistance tests for motors, generators, control and power cable, to ensure conformance with specifications.	*(f)* electrical insulation — performance of insulation resistance tests for motors, generators, and control and power cable to ensure conformance with specifications.	OK
5.2.3 Special Inspection — Where receiving inspection in addition	**5.2.3 Special Inspection.** Where receiving inspection in addition to that	OK

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
to that described above is required, the "Special Inspection" procedure, complete with documentation instructions, shall be attached to the item or container (see Section 3 of this standard); this is in addition to the copy sent through normal channels. The special inspection shall be performed and the results of the inspection shall be documented.	described above is required, the special inspection procedure, complete with documentation instructions, shall be attached to the item or container. This is in addition to the copy sent through normal channels. The special inspection shall be performed, and the results of the inspection shall be documented.	
5.3 Disposition of Received Items	**5.3 Disposition of Received Items**	OK
5.3.1 Acceptable — Containers and items inspected or examined and found in conformance with specified requirements shall be identified as acceptable in accordance with the status indicating system employed (see Subsection *5.4* of this standard) and placed in a storage area for acceptable items or moved to the final location for installation or use.	**5.3.1 Acceptable.** Containers and items inspected and found in conformance with specified requirements shall be identified as acceptable (see para. 5.4) and placed in a storage area for acceptable items, or moved to the final location for installation or use.	N45.2.2 adds the words "or examined" and "in accordance with the status indicating system employed". Similar, Same Intent.
5.3.2 Nonconforming — Items which do not conform to the specified requirements shall be identified as nonconforming in accordance with the system employed (see Subsection 5.4 of this standard) and when practical the item shall be placed in a segregated storage area or removed from the project site to prevent inadvertent installation or use.	**5.3.2 Nonconforming.** Items which do not conform to the specified requirements shall be controlled in accordance with Part I. Part I, Supplement 15S-1 3 Segregation: (a) Nonconforming items shall be segregated, when practical, by placing tem in a clearly identified and designated hold area until properly dispositioned. (b) When segregation is impractical or impossible due to physical conditions such as size, weight, or access limitations, other precautions shall be employed to preclude inadvertent use of a nonconforming item.	N45.2.2 adds the words "identified…in accordance with the system employed" whereas NQA-1 uses the word "controlled in accordance with Part 1." Similar, Same Intent.
5.3.3 Conditional Release — If the nonconformance which caused the item to be classified "unacceptable" can be corrected after installation, the item may be released for installation on a conditional release basis. A statement documenting the authority and technical justification for the conditional release of the item for installation shall be prepared, and made part of the documentation.	**5.3.3 Conditional Release.** If the nonconformance that caused the item to be classified unacceptable can be corrected after installation, the item may be released for installation on a conditional release basis. A statement documenting the authority and technical justification for the conditional release of the item for installation shall be prepared and made part of the documentation.	OK
5.4 Status Indicating System A system or method for identifying the status of items (e.g. an inventory system, tagging, labeling, color code) shall be employed that clearly indicates whether items are acceptable or unacceptable for installation.	**5.4 Status Indicating System** A status indicating system is a system or method for identifying the status of items (e.g., an inventory system, tagging, labeling, color code) that clearly indicates whether items are acceptable or unacceptable for installation.	N45.2.2 states that the system "shall be employed", NQA-1 does not use these words.
A controlled physical separation is an acceptable equivalent method.	A controlled physical separation is an acceptable equivalent method.	OK
The system shall indicate the date the item was placed in the acceptable or unacceptable installation status. The	The system shall provide for indication of the date the item was placed in the acceptable or unacceptable installation	N45.2.2 states that "The use of the system shall be regulated by the Quality Control program." NQA-1

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
use of the system shall be regulated by the Quality Control program. The system shall provide for the conditional release of items for installation pending subsequent correction of the nonconformance.	status and the conditional release of the items for installation pending the subsequent correction of the nonconformance.	does not state this.
When tags are used the stock shall be made from material which will not deteriorate during storage;	When tags are used, the stock shall be made from material that will not deteriorate during storage.	OK
tags shall be securely affixed to the items and displayed in an area that is readily accessible.	Tags shall be securely affixed to the items and displayed in an area that is readily accessible.	OK
The stock used shall not be deleterious to the item.	The stock used shall not be deleterious to the item.	OK
5.5 Correction of Nonconformances Items designated nonconforming or unacceptable for installation or use shall be corrected using authorized procedures, to meet specified requirements, or accepted "As is". If this is not possible, the item shall be scrapped or otherwise discarded.	**Supplement 15S-1 "Supplementary Requirements for the Control of Nonconforming Items"** **Paragraph 4.4** Technical justification for the acceptability of a nonconforming item, dispositioned repair, or use-as-is shall be documented.	NQA-1 does not include words "If this is not possible, the item shall be scrapped or otherwise discarded".
5.5.1 Reinspection — Items that have been corrected shall be reinspected. The area of inspection may be confined to the area of the nonconformance. When it has been determined that the corrected item is satisfactory, the status of the item as denoted by the system shall be changed to acceptable. An appropriate entry shall be made in the documentation after acceptance is determined.	**Supplement 15S-1 "Supplementary Requirements for the Control of Nonconforming Items"** **Paragraph 4.5** 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.	N45.2.2 provides greater detail as to actions to take when it is determined that the corrected item is satisfactory.
5.6 Marking Required marking shall be verified to provide positive identification during receiving, storage, and installation. Items not properly identified at receiving may be marked using the method in the appendix (see Appendix A 3.9 of this standard).	**BR 8 "Identification and Control of Items"** Identification shall be maintained on items or in documents traceable to the items, or in a manner which assures that identification is established and maintained.	Slightly different words, but same intent.
Changing, correcting or any other marking on Code Stamp name plate is prohibited, unless authorized by the manufacturer whose serial number is applied.	**5.5 Marking** Changing, correcting, or any other marking on Code stamp nameplate shall be prohibited, unless authorized by the manufacturer of the item.	N45.2.2 uses the words "whose serial number is applied" when referring to who can authorize changes, etc. NQA-1 states "manufacturer of the item."
5.7 Documentation A written record of the receiving inspection, package identification, tagging, corrective actions, and justification for conditional acceptance shall be prepared.	**5.6 Documentation** A written record of the receiving inspection, package identification, tagging, corrective actions, and justification for conditional acceptance shall be prepared.	OK
These records shall be made a part of the permanent records provided for in Section 8 of this standard.	Basic Requirement 17 "Quality Assurance Records" and QAPP B.15 "Records" detail requirements of records that need to be maintained.	OK
6. STORAGE	**6 STORAGE** **6.1 General**	OK

Enclosure 4, Table 2
ANSI N45.2.2-1972 vs NQA-1-1994, Subpart 2.2

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
6.1 General **6.1.1 Scope.** This section contains requirements that are to be fulfilled by the organization responsible for performing the storage of items.	**6.1.1 Scope.** This Section contains requirements that shall be fulfilled by the organization responsible for performing the storage of items.	
Levels and methods of storage, necessary are defined to minimize the possibility of damage or lowering of quality due to corrosion, contamination, deterioration or physical damage from the time an item is stored upon receipt until the time the item is removed from storage and placed in its final location.	Levels and methods of storage are defined to minimize the possibility of damage or lowering of quality due to corrosion, contamination, deterioration, or physical damage from the time an item is stored upon receipt until the time the item is removed from storage and placed in its final location.	NQA-1 adds some details on what lowering of quality could be due to. N45.2.2 specifies the time frame as "upon receipt" whereas NQA-1 uses the term "from the time an item is stored."
6.1.2 Levels of Storage. Environmental conditions for items classified as Levels A, B, C, and D described in Subsection 2.7 of this Standard shall meet requirements as described in the following paragraphs:	**6.1.2 Levels of Storage.** Environmental conditions for items classified as Levels A, B, C, and D described in para. 2.2 shall meet the requirements as described in the following paragraphs.	OK
(1) Level A items shall be stored under special conditions similar to those described for Level B items but with additional requirements such as temperature and humidity control within specified limits, a ventilation system with filters to provide an atmosphere free of dust and harmful vapors, and any other appropriate requirements.	*(a)* Level A items shall be stored under special conditions similar to those described for Level B items but with additional requirements such as temperature and humidity control within specified limits, a ventilation system with filters to provide an atmosphere free of dust and harmful vapors, and any other appropriate requirements.	OK
(2) Level B items shall be stored within a fire resistant, tear resistant, weathertight, and well ventilated building or equivalent enclosure. Precautions shall be taken against vandalism.	*(b)* Level B items shall be stored within a fire-resistant, tear-resistant, weather-tight, and well-ventilated building or equivalent enclosure. Precautions shall be taken against vandalism.	OK
This area shall be situated and constructed so that it will not be subject to flooding; the floor shall be paved or equal, and well drained. Items shall be placed on pallets or shoring to permit air circulation.	This area shall be situated and constructed so that it will not be subject to flooding; the floor shall be paved or equal, and well drained. Items shall be placed on pallets or shoring to permit air circulation.	OK
The area shall be provided with uniform heating and temperature control or its equivalent to prevent condensation and corrosion.	The area shall be provided with uniform heating and temperature control or its equivalent to prevent condensation and corrosion.	OK
Minimum temperature shall be 40 F and maximum temperature shall be 140 F or less if so stipulated by a manufacturer.	The minimum temperature shall be 40^0F (5^0C), and the maximum temperature shall be $14O^0$ F (60^0C) or less if so stipulated by the manufacturer.	NQA-1 adds the Celsius equivalents.
(3) Level C items shall be stored indoors or equivalent with all provisions and requirements as set forth in Level B items except that heat and temperature control is not required.	(c) Level C items shall be stored indoors or in an equivalent environment with all provisions and re-quirements as set forth for Level B items, except that heat and temperature control is not required.	OK
(4) Level D items may be stored outdoors in an area marked and designated for storage, which is well drained, preferably gravel covered or paved and reasonably removed from the actual construction area and traffic	*(d)* Level D items may be stored outdoors in an area marked and designated for storage that is well drained, preferably gravel covered or paved, and reasonably removed from the actual construction area and traffic	OK

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
so that possibility of damage from construction equipment is minimized. Items shall be stored on cribbing or equivalent to allow for air circulation and to avoid trapping water.	so that the possibility of damage from construction equipment is minimized. Items shall be stored on cribbing or equivalent to allow for air circulation and to avoid trapping water.	
6.2 Storage Areas Periodic inspections shall be performed to assure that storage areas are being maintained in accordance with these requirements.	**6.2 Storage Areas** Periodic inspections shall be performed to assure that storage areas are being maintained in accordance with applicable requirements.	N45.2.2 uses words "these requirements" whereas NQA-1 uses "applicable requirements"
The housekeeping requirements shall be in accordance with N45.2.3.	NQA-1 Subpart 2.3 replaced N45.2.3.	Specific provisions of Subpart 2.3 which are applicable to project activities will be defined in associated procedures.
6.2.1 Access to Storage Areas. Access to storage areas shall be controlled and limited only to personnel designated by the responsible organization.	**6.2.1 Access to Storage Areas.** Access to storage areas for Levels A, B, and C items shall be controlled and limited only to personnel designated by the responsible organization. Access to storage areas involving Level D items shall be controlled as designated by the responsible organization.	N45.2.2 states that access to storage areas for all levels shall be controlled. NQA-1 allows that "Access to storage areas involving Level D items shall be controlled as designated by the responsible organization."
6.2.2 Cleanliness and Housekeeping Practices. Cleanliness and good housekeeping practices shall be enforced at all times in the storage areas. The storage areas shall be cleaned as required to avoid the accumulation of trash, discarded packaging materials and other detrimental soil.	**6.2.2 Cleanness and Housekeeping Practices.** Cleanliness and good housekeeping practices shall be enforced at all times in the storage areas. The storage areas shall be cleaned as required to avoid the accumulation of trash, discarded packaging materials, and other detrimental soil.	OK
6.2.3 Fire Protection. Fire protection commensurate with the type of storage area and the material involved shall be provided and maintained.	**6.2.3 Fire Protection.** Fire protection commensurate with the type of storage area and the material involved shall be provided and maintained.	OK
6.2.4 Storage of Food and Associated Items. The use or storage of food, drinks, and salt tablet dispensers in any storage area shall not be permitted.	**6.2.4 Storage of Food and Associated Items.** The use or storage of food, drinks, and salt tablet dispensers in controlled storage areas shall not be permitted.	OK
6.2.5 Measures to Prevent Entrance of Animals. Measures shall be taken to prevent the entrance of rodents and other animals into indoor storage areas or equipment to minimize possible contamination and mechanical damage to stored material.	**6.2.5 Measures to Prevent Entrance of Animals.** Measures shall be taken to prevent the entrance of rodents and other animals into indoor storage areas or equipment to minimize possible contamination and mechanical damage to stored material.	OK
6.3 Storage Methods Storage methods and procedures shall comply with the requirements described in the following paragraphs.	**6.3 Storage Methods** Storage methods and procedures shall comply with the requirements described in the following paragraphs.	OK
6.3.1 Ready Access to Stored Items. All items shall be stored in such a manner as to permit ready access for inspection or maintenance without excessive handling, to minimize risk of damage.	**6.3.1 Ready Access to Stored Items.** All items shall be stored in such a manner as to permit ready access for inspection or maintenance without excessive handling to minimize risk of damage.	OK
6.3.2 Arrangement of Items. Items	**6.3.2 Arrangement of Items.** Items	OK

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
stacked for storage shall be arranged so that racks, cribbing or crates are bearing the full weight without distortion of the item.	stacked for storage shall be arranged so that racks, cribbing, or crates are bearing the full weight without distortion of the item.	
6.3.3Storage of Hazardous Material. Hazardous chemicals, paints, solvents, and other materials of a like nature shall be stored in well ventilated areas which are not in close proximity to important nuclear plant items.	**6.3.3 Storage of Hazardous Material.** Hazardous chemicals, paints, solvents, and other materials of a like nature shall be stored in well-ventilated areas and not in close proximity to important nuclear plant items.	OK
6.3.4 Identification. All items and their containers shall be plainly marked so that they are easily identified without excessive handling, or unnecessary opening of crates and boxes.	**6.3.4 Identification.** Items and their containers shall be plainly marked so that they are easily identified without excessive handling or unnecessary opening of crates and boxes.	OK
6.3.5 Coverings. Weatherproof covering, when used for outdoor storage, shall be flame-resistant type of sheeting or tarpaulins. They shall be placed so as to provide drainage and to insure air circulation to minimize condensation. They shall be tied down to prevent moisture from entering laps and to protect the coverings from wind damage.	**6.3.5 Coverings.** Weatherproof coverings, when used for outdoor storage, shall be the flame-resistant type of sheeting or tarpaulins. They shall be placed so as to provide drainage and to ensure air circulation to minimize condensation. They shall be tied down to prevent moisture from entering laps and to protect the coverings from wind damage.	OK
	6.3.6 Outdoor Storage. Items stored outdoors shall be positioned or covered to avoid trapping moisture in pockets or internally. For example, valves shall be positioned such that water does not collect under the bonnet but can drain from the valve packing area.	These words are not in N45.2.2.
6.4 Control of Items in Storage Control of items in storage is described in the following paragraphs.	**6.4 Control of Items in Storage** Control of items in storage is described in the following paragraphs.	OK
6.4.1 Inspections and Examinations. Inspections and examinations shall be performed and documented on a periodic basis to assure that the integrity of the item and its container as provided for under Section 3 of this standard is being maintained.	**6.4.1 Inspections.** Inspections shall be performed and documented on a periodic basis to assure that the integrity of the item and its container, as provided for under Section 3, is being maintained.	N45.2.2 contained the words "and examinations". Similar, same intent.
Deficiencies noted shall be corrected and documented.	Deficiencies noted shall be corrected and documented.	OK
The characteristics verified during this inspection or examination shall include such items as:	The characteristics verified during this inspection shall include such items as:	OK
(1) Identification and marking (see Subsection 3.9 of this Standard). (2) Protective covers and seals (see Subsection 3.9 of this standard). (3) Coatings and preservatives (see paragraph 3.4.1). (4) Desiccants and inert gas blankets (see paragraph 3.6.3 and 3.4.2). *(5)* Physical damage. (6) Cleanness.	(a) identification and marking (see para. 3.9) (a) protective covers and seals (see para. 3.6) (b) coatings and preservatives (see para. 3.4.1) (c) desiccants and inert gas blankets (see paras. and 3.4.2) (d) physical damage (e) cleanness	OK
6.4.2 Care of Items. Care of items in storage shall be exercised in accordance with the following. Requirements for proper maintenance	**6.4.2 Care of Items.** Requirements for proper maintenance during storage shall be documented. Care of items in storage (includes storage in place)	NQA-1 adds the parenthesis "(includes storage in place)".

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
during storage shall be documented and written procedures or instructions shall be established.	shall be exercised in accordance with the following.	
(1) Items in storage shall have all covers, caps, plugs or other closures intact. Methods used to seal openings shall be in accordance with Section 3 of this standard. Covers removed for internal access at any time for any reason shall be immediately replaced and resealed after completion of the purpose for removal.	*(a)* Items in storage shall have all covers, caps, plugs, or other closures intact. Methods used to seal openings shall be in accordance with Section 3. Covers removed for internal access shall be immediately replaced and resealed after completion of the purpose for removal.	OK
(2) Temporary preservatives shall be left intact during storage. Should reapplication of preservatives be required at the site, only those previously approved shall be used.	*(b)* Temporary preservatives shall be left intact during storage. Should reapplication of preservatives be required at the site, only those previously approved shall be used.	OK
(3) Items pressurized with inert gas shall be monitored at such a frequency as to insure that the gas pressure is maintained within specified limits during storage. Desiccant humidity indicators shall also be monitored and desiccants shall be changed or re-processed when specified.	(c) Items pressurized with inert gas shall be monitored at such a frequency as to ensure that the gas pressure is maintained within specified limits during storage. Desiccant humidity indicators shall also be monitored, and desiccants shall be changed or reprocessed when specified.	OK
(4) Instrumentation racks shall be energized as specified by the manufacturer.	*(d)* Instrumentation racks shall be energized as specified by the manufacturer.	OK
(5) Space heaters enclosed in electrical items shall be energized.	(e) Space heaters enclosed in electrical items shall be energized.	OK
(6) Rotating electrical equipment shall be given insulation resistance tests on a scheduled basis.	*(f)* Rotating electrical equipment shall be given insulation resistance tests on a scheduled basis.	OK
(7) *The shafts of rotating* equipment shall be rotated on a periodic basis. The degree of turn shall be established so that the parts receive a coating of lubrication where applicable, and so that the shaft does not come to rest in a previous position. (90 deg. and 450 deg. rotations are examples.)	*(g) The shafts of rotating equipment* shall be rotated on a periodic basis. The degree of turn shall be established so that the parts receive a coating of lubrication, where applicable, and so that the shaft does not come to rest in a previous position (90 deg. and 450 deg. rotations are examples).	OK
(8) Other maintenance requirements specified by the manufacturer's instruction for the item shall be performed.	*(h)* Other maintenance requirements specified by the manufacturer's instructions for the item shall be performed.	OK
6.4.3 Post Fire Evaluation. In the event a fire should occur in the storage area or at any time, each item known to have been heated to an ambient temperature of over 150 F or subjected to smoke contamination shall be withheld from installation or use until it has been thoroughly examined and the item has been verified to be in conformance with specified requirements.	**6.4.3 Post-Fire Evaluation.** In the event a fire should occur in the storage area at any time, each item known to have been heated to an ambient temperature of over 150°F (65°C) or subjected to smoke contamination shall be withheld from installation or use until it has been thoroughly examined, and the item has been verified to be in conformance with specified requirements.	NQA-1 deletes the word "or" in the following from N45.2.2 "In the event a fire should occur in the storage area or at any time..." Additionally, NQA-1 adds the metric equivalent to the temperature.
6.5 Removal of Items from Storage Only items which have been inspected and are considered acceptable for installation or use in accordance with the receiving inspection procedure shall be removed from storage for	**6.5 Removal of Items From Storage** Only items which have been inspected and are considered acceptable for installation or use in accordance with the receiving inspection procedure shall be removed from storage for	OK

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
installation or use. (See Section 5 of this standard.)	installation or use (see Section 5).	
Items released from storage and placed in their final locations within the power plant, shall be inspected and cared for in accordance with the requirements of Section 6 of this standard, and other applicable standards.	Items released from storage and placed in their final locations and items stored in place within the power plant shall be inspected and cared for in accordance with the requirements of paras. 6.4.1 and 6.4.2 and other standards, as applicable.	OK
6.6 Storage Records Written records shall be prepared that include such pertinent information as storage location, inspection results, protection, and personnel access.	**6.6 Storage Records** Written records shall be prepared that include such pertinent information as storage location, inspection results, protection, and personnel access.	OK
7. HANDLING **7.1 General** This section contains requirements that are to be fulfilled by the organizations responsible for handling items. This section covers the requirements for the handling of items in Subsection 2.7 of this standard utilizing appropriate equipment in accordance with methods and procedures specified to minimize damage and preserve the quality of the item and container.	**7 HANDLING** **7.1 General** The requirements that shall be fulfilled by the organizations responsible for handling items are contained in Subpart 2.15.	N45.2.2 contains details for handling items, NQA-1 refers to another Subpart. QAPP Section 4.13 establishes general handling requirements. Specific provisions of Subpart 2.15 which are applicable to project activities will be defined in associated procedures.
7.2 Methods and Procedures Detailed handling instructions and procedures shall be prepared for all items that require special handling instructions because of weight, size, susceptibility to shock damage, high nil ductility transition temperatures, or any other conditions that warrant special instructions.		N45.2.2 contains details for handling items, NQA-1 refers to another Subpart. QAPP Section 4.8 establishes general handling requirements. Specific provisions of Subpart 2.15 which are applicable to project activities will be defined in associated procedures.
Such instructions or procedures shall be made available prior to the time the item is to be handled and shall give weights, sling locations, balance points, methods of attachment, maximum hoist line speeds and other pertinent features to be considered as necessary for safe handling.		N45.2.2 contains details for handling items, NQA-1 refers to another Subpart. QAPP Section 4.13 establishes general handling requirements. Specific provisions of Subpart 2.15 which are applicable to project activities will be defined in associated procedures.
Items not specifically covered above shall be handled in accordance with sound material handling practices.		N45.2.2 contains details for handling items, NQA-1 refers to another Subpart. QAPP Section 4.13 establishes general handling requirements. Specific provisions of Subpart 2.15 which are applicable to project activities will be defined in associated procedures.
7.3 Hoisting Equipment All equipment for handling items shall be used and maintained in accordance with the following:		N45.2.2 contains details for handling items, NQA-1 refers to another Subpart. QAPP Section 4.13 establishes general handling requirements. Specific provisions of Subpart 2.15 which are applicable to project activities will be defined in associated procedures.
7.3.1 Hoisting equipment used for		N45.2.2 contains details for handling

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
handling shall be certified by the manufacturer. The certification shall indicate the various parameters for the maximum load to be handled.		items, NQA-1 refers to another Subpart. QAPP Section 4.13 establishes general handling requirements Specific provisions of Subpart 2.15 which are applicable to project activities will be defined in associated procedures.
7.3.2 Hoisting equipment shall not be loaded beyond its rated load, as certified by the manufacturer, except for test purposes.		N45.2.2 contains details for handling items, NQA-1 refers to another Subpart. QAPP Section 4.13 establishes general handling requirements Specific provisions of Subpart 2.15 which are applicable to project activities will be defined in associated procedures.
7.3.3 The requirements of ANSI B30.2.0, Safety Standard for Overhead and Gantry Cranes, ANSI B30.5, Safety Standard for Crawler, Locomotive and Truck Cranes, ANSI B30.6, Safety Standard for Derricks, and ANSI A10.5, Safety Requirements for Material Hoists shall be followed.		N45.2.2 contains details for handling items, NQA-1 refers to another Subpart. QAPP Section 4.13 establishes general handling requirements. Specific provisions of Subpart 2.15 which are applicable to project activities will be defined in associated procedures.
7.3.4 For special lifts, hoisting equipment may be re-rated, or modified and re-rated, upon approval by the manufacturer or if the manufacturer's specifications are not available, the limitations assigned to the equipment shall be based on the determinations of a qualified engineer competent in this field and such determination shall be documented and recorded appropriately. Re-rated equipment shall be given a dynamic load test over the full range of the lift using a test weight at least equal to the lift weight. A dynamic test includes raising, lowering and traversing the load in contrast to a static test where the test weight may be increased incrementally with no movement.		Specific provisions of Subpart 2.15 which are applicable to project activities will be defined in associated procedures.
7.4 Inspection of Equipment and Rigging An inspection program shall be established for equipment and rigging. A system shall be established that will indicate acceptability of all equipment and rigging after each inspection. This system shall specify control of nonconforming lifting equipment. Periodic inspections shall be supplemented with special visual and non-destructive examinations and dynamic load tests prior to handling of items described in Subsection 7.2 of this standard.		N45.2.2 contains details for handling items, NQA-1 refers to another Subpart. QAPP Section B.7 establishes general handling requirements. Specific provisions of Subpart 2.15 which are applicable to project activities will be defined in associated procedures.
7.4.1 Rigging that is frayed, worn or otherwise deteriorated shall not be used.		N45.2.2 contains details for handling items, NQA-1 refers to another Subpart. QAPP Section 4.13 establishes general handling requirements Specific provisions of Subpart 2.15 which are applicable to project activities will be defined in associated procedures.

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
7.4.2 Hoisting equipment that does not meet manufacturer's specifications shall not be used.		N45.2.2 contains details for handling items, NQA-1 refers to another Subpart. QAPP Section 4.13 establishes general handling requirements. Specific provisions of Subpart 2.15 which are applicable to project activities will be defined in associated procedures
7.4.3 Equipment and rigging shall be kept clean and free of contaminants that are detrimental to the material being handled.		N45.2.2 contains details for handling items, NQA-1 refers to another Subpart. QAPP Section 4.13 establishes general handling requirements. Specific provisions of Subpart 2.15 which are applicable to project activities will be defined in associated procedures.
7.4.4 Rigging items such as hooks, shackles, and turnbuckles that appear to have yielded or are distorted shall not be used.		N45.2.2 contains details for handling items, NQA-1 refers to another Subpart. QAPP Section 4.13 establishes general handling requirements. Specific provisions of Subpart 2.15 which are applicable to project activities will be defined in associated procedures.
7.5 Personnel The responsible organization shall determine that the personnel engaged in operating material handling equipment are competent and have demonstrated satisfactory ability in operating similar lifting equipment.	Supplement 13S-1 "Supplementary Requirements for Handling, Storage, and Shipping" Section 3.4 Operators of special handling and lifting equipment shall be experienced or trained in use of the equipment.	Slightly different words, but same intent.
8. RECORDS Record copies of completed procedures; reports; personnel qualification records; test equipment calibration records; test deviation or exception records; and inspection and examination records shall be prepared as required by this standard.	**8 RECORDS** Record copies of procedures, reports, personnel qualification records, test equipment calibration records, test deviation or exception records, and inspection records shall be prepared as required by this Subpart.	N45.2.2 uses "completed procedures", NQA-1 states "procedures" and N45.2 uses "inspection and examination records" whereas NQA-1 states "inspection records". Similar, Same Intent.
These records shall be placed with other project records as required by code, standard, specification or project procedures.	These records shall be retained with other project records as required by code, standard, specification, or project procedures.	N45.2.2 uses the word "placed", NQA-1 uses the word "retained".
9. AMERICAN NATIONAL STANDARDS REFERRED TO IN THIS DOCUMENT When the following standards referred to in this document are superseded by a revision approved by the American National Standards Institute, the revision shall apply: N45.2 Quality Assurance Program Requirements for Nuclear Power Plants *N4523 Housekeeping During the Construction Phase of Nuclear Power Plants **N45.2.6* Qualifications of Quality Assurance Personnel for the		N/A- These words are not contained in NQA-1 nor would they be expected to be.

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
Construction Phase of Nuclear Power Plants *N45.2.10 Quality Assurance Terms and Definitions MH 6.1 Pictorial Markings for Handling of Goods B30.2.0 Safety Code for Overhead and Gantry Cranes B30.S Safety Code for Crawler, Locomotive, and Truck Cranes B30.6 Safety Code for Derricks A10.5 Safety Requirements for Material Hoists *The standards are being approved by the American National Standards Institute and they should be available early in 1973.		
10. APPENDIX		
A3 PACKAGING The following are additional minimum requirements to be used with the rules of Section 3 of N45.2.2: "Packaging, Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants".		The specified requirements are now included in the body of NQA-1, Subpart 2.2.
A3.3 Cleaning Specific cleaning procedures are considered to be part of the manufacturing specifications. The following general criteria shall apply:	**3.3 Cleaning** The following general criteria shall apply as part of the manufacturing specifications specific cleaning procedures.	OK
(1) The cleaning process including cleaning compounds chosen shall in no way damage the item during cleaning or subsequent service when considering the composition, surface finish, complexity or other inherent features or other interface equipment after installation.	*(a)* The cleaning process, including cleaning compounds chosen, shall in no way damage the item during cleaning or subsequent service when considering the composition, surface finish, complexity, or other inherent features, or other interface equipment after installation.	OK
(2) The cleaning process or processes chosen shall remove loose mill and heat scale, oil, rust, grease, paint, welding fluxes, chalk, abrasives, carbon deposits, coatings used for nondestructive testing processes and other contaminants which would render ineffective the method of preservation and packaging, or other specified requirements.	*(b)* The cleaning process or processes chosen shall remove loose mill and heat scale, oil, rust, grease, paint, welding fluxes, chalk, abrasives, carbon deposits, coatings used for nondestructive testing processes, and other contaminants that would render ineffective the method or preservation and packaging or other specified requirements.	OK
(3) Item surfaces after cleaning shall be free of cleaning media, such as aluminum oxide, silica, grit, lint, chemical cleaning residue, petroleum solvent residue, etc.	(c) Item surfaces after cleaning shall be free of cleaning media, such as aluminum oxide, silica, grit, lint, chemical cleaning residue, and petroleum solvent residue, etc.	OK
(4) After cleaning, the item shall be protected from contamination until preservation or packaging is complete.	*(d)* After cleaning, the item shall be protected from contamination until preservation or packaging is complete.	OK

Enclosure 4, Table 2
ANSI N45.2.2-1972 vs NQA-1-1994, Subpart 2.2

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
A3.4.1 Contact Preservatives. The following criteria shall be used when considering the type of contact preservative to be used.	**3.4.1 Contact Preservatives.** The following criteria shall be used when considering the type of contact preservative to be used.	OK
(1)The contact preservative shall be compatible with the material on which it is applied.	(a) The contact preservative shall be compatible with the material on which it is applied.	OK
(2) Contact preservatives which are nondrying shall require a neutral-grease-proof protective wrap when packaged.	*(b)* Contact preservatives which are nondrying shall require a neutral grease-proof protective wrap when packaged.	OK
(3) The procedure for applying contact preservatives shall not require disassembly of the item nor shall it be necessary to disassemble the item at the site for complete removal. An exception would be for long term storage protection to be agreed upon by the owner, buyer and manufacturer.	(c) The procedure for applying contact preservatives shall not require disassembly of the item nor shall it be necessary to disassemble the item at the site for complete removal. An exception would be for long-term storage protection to be agreed upon by the owner, buyer, and manufacturer.	OK
(4) The method of contact preservative removal shall be accomplished with approved solvents *and wiping cloths or by flushing* internal cavities with solvents which are not deleterious to the item or other interconnecting material. However, preservatives for inaccessible inside surfaces of pumps, valves and pipe for systems containing reactor coolant water shall be indicated to facilitate touch-up.	*(d)* The method of contact preservative removal shall be accomplished with approved solvents and wiping cloths or by *flushing internal cavities with sol*vents which are not deleterious to the item or other interconnecting material. However, preservatives for inaccessible inside surfaces of pumps, valves, and piping for systems containing reactor coolant water shall be the water flushable type.	N45.2.2 states "...shall be indicated to facilitate touch-up" whereas NQA-1 states "shall be the water flushable *type*"
(5) *The name of the* preservative used shall be the water flushable type.	*(e) The name of the preservative used* shall be provided to facilitate touch-up.	*In regards to the name of the* preservative used, N45.2.2 states "...shall be the water flushable type" whereas NQA-1 states "shall be provided to facilitate touch-up"
(6) When motors, pumps, turbines, etc., are shipped with oil reservoirs and bearings cavities filled with preservative oil, the item shall be so tagged and instructions for draining, flushing, refilling and periodic rotation shall be included with the item.	*(f)* When motors, pumps, turbines, etc., are shipped with oil reservoirs and bearing cavities filled with preservative oil, the item shall be so tagged and instructions for draining, flushing, refilling, and periodic rotation shall be included with the item.	OK
(7) When it is anticipated that the item might require an extended storage period, six (6) months or longer, a preservative needed for the long term protection of the item shall be applied or arrangements shall be made to periodically reapply the preservatives.	*(g)* When it is anticipated that the item might require an extended storage period (6 months or longer), a preservative needed for the long-term protection of the item shall be applied or arrangements shall be made to periodically reapply the preservatives.	OK
A3.4.2 Inert Gas Blankets. When inert gas blankets are used, the following criteria shall apply:	**3.4.2 Inert Gas Blankets.** When inert gas blankets are used, the following criteria shall apply.	OK
(1) Inert gas blankets shall be used only when the exterior shell of the item or its container can be tightly sealed to form a leak-proof barrier.	(a) Inert gas blankets shall be used only when the exterior shell of the item or its container can be tightly sealed or an inert gas blanket can otherwise be maintained.	N45.2.2 states "to form a leak-proof barrier" whereas NQA-1 states "or an inert gas blanket can otherwise be maintained."
(2) Only a commercial grade of dry, oil-free, inert gas shall be used.	*(b)* Only dry, oil free, inert gas shall be used.	NQA-1 deleted the words "commercial grade"
(3) Provisions shall be made for measuring and maintaining the blanket pressure within the required range within each pressurized purged item or	(c) Provisions shall be made for measuring and maintaining the blanket pressure within the required range and within each pressurized purged item or	NQA-1 adds words "when used to maintain a static pressure"

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
container. Closures and seals shall be tightly secured so that the absolute (by mass) pressure after final seal is maintained for 24 hours without adding gas, prior to shipping the item from the manufacturer's plant.	container. Closures and seals, when used to maintain a static pressure, shall be tightly secured so that the absolute pressure (by mass) after final seal is maintained for 24 hr, without adding gas, prior to shipping the item from the manufacturer's plant.	
(4) The item or container shall be marked in bold letters cautioning that an inert gas blanket has been used. The required pressure range also shall be marked on the item or container.	*(d)* The item or container shall be marked in bold letters cautioning that an inert gas blanket has been used. The required pressure range also shall be marked on the item or container.	OK
A3.5.1 Caps and Plugs. Caps and plugs shall conform to the following criteria:	**3.5.1 Caps and Plugs.** Caps and plugs shall conform to the following criteria.	OK
(1) Nonmetallic plugs and caps shall be brightly colored. Clear plastic closures are not to be used except when specified for a special purpose; for example, as a window for humidity indicator cards. Special attention shall be given in the control of these closures.	(a) Nonmetallic plugs and caps shall be brightly or contrastingly colored. Clear plastic closures are not to be used except when specified for a special purpose: for example, as a window for humidity indicator cards. Special attention shall be given in the control of these closures.	NQA-1 adds the words "or contrastingly" when detailing color
(2) Metallic plugs and caps contacting metal surfaces shall not cause galvanic corrosion at the contact areas. Gasketing or other nonmetallic materials used in conjunction with metallic caps or plugs shall exhibit no corrosive effect on the material.	*(b)* Metallic plugs and caps contacting metal surfaces shall not cause galvanic corrosion at the contact areas. Gasketing or other nonmetallic materials used in conjunction with metallic caps or plugs shall exhibit no corrosive effect on the material.	OK
(3) Simplicity of installation, inspection, and removal without damage to the item shall be considered.	(c) Simplicity of installation, inspection, and removal without damage to the item shall be considered.	OK
(4) Provisions shall be made to preclude the plug or cap from falling into or being pushed into the opening after its installation.	*(d)* Provisions shall be made to preclude the plug or cap from falling into or being pushed into the opening after its installation.	OK
(5) Plugs or caps shall be secured with tape (see paragraph A3.5.2 of this Appendix) or other means as necessary to prevent accidental removal.	(e) Plugs or caps shall be secured with tape (see para. 3.5.2) or other means as necessary to prevent accidental removal.	OK
(6) All plugs and caps shall be clean and free of visible contamination such as, but not limited to dust, dirt, stains, rust, discoloration or scale.	*(f)* All plugs and caps shall be clean and free of visible contamination such as, but not limited to, dust, dirt, stains, rust, discoloration, or scale.	OK
(7) Plugs and caps used in contact with austenitic stainless steel shall be made from nonhalogenated materials or stainless steel.	*(g)* Plugs and caps used in contact with austenitic stainless steel shall be made from nonhalogenated materials or stainless steel.	OK
A3.5.2 Tapes and Adhesives. Tapes and adhesives shall conform to the following criteria:	**3.5.2 Tapes and Adhesives.** Tapes and adhesives shall conform to the following criteria.	OK
(1) When contacting austenitic stainless steel and nickel alloy surfaces:	*(a)* When contacting austenitic stainless steel and nickel alloy surfaces:	OK
(a) The halogen and sulfur contents of tapes should not be in excess of 0.10% by weight each. Paperbacked (masking) tape shall not be used.	*(1)* tapes shall not be compounded from or treated with chemical compounds containing elements in such quantities that harmful concentrations are leachable, or that they could be released by breakdown under expected environmental conditions and could contribute to	N45.2.2 states that contents "should not be in excess of 0.10% by weight each" whereas NQA-1 provides more detail but does not specify a %.

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	intergranular cracking or stress corrosion cracking, such as those containing fluorides, chlorides, sulfur, lead, zinc, copper, and mercury [paperbacked (masking) tape shall not be used];	
(b) Upon removal of tape, all residual adhesive shall be removed by a non-halogenated solvent (acetone, alcohol or equal) wiping.	(2) upon removal of tape, all residual adhesive shall be removed by wiping with a nonhalogenated solvent (acetone, alcohol, or equal);	OK
(c) Starch, silicone and epoxy type material may be used for tape adhesives.	*(3)* starch, silicone, and epoxy tape material may be used for tape adhesive.	OK
(2) When contacting other surfaces and containers:	*(b)* When contacting other surfaces and containers:	OK
(a) Tapes and adhesives used to seal nonaustenitic materials or containers are not subject to the above restrictions.	*(1)* tapes and adhesives used to seal nonaustenitic materials or containers are not subject to the above restrictions;	OK
(b) Tape shall be impervious to water and not subject to cracking or drying out if exposed to sunlight, heat or cold.	*(2)* tape shall be impervious to water and not subject to cracking or drying out if exposed to sunlight, heat, or cold.	OK
(3) Tapes should be brightly colored to preclude their loss into a system.	(c) When used on surfaces of items, tapes shall be visibly distinguishable from the materials on which they are used.	N45.2.2 and NQA-1 use different words but the intent is same.
A3.6.2 Vapor Barrier Material. When maximum vapor protection is required, barrier material shall meet the maximum water vapor transmission rate of 0.05 grams per 100 square inches per 24 hours per ASTM E96 Tests for Water Vapor Transmission Of Materials In Sheet Form, Procedure E and shall be packaged with an approved desiccant.	**3.6.2 Vapor Barrier Material.** When maximum vapor protection is required, barrier material shall meet the maximum water vapor transmission rate of 0.05 g/100 sq in. per 24 hr required by ASTM E 96, Test Methods for Water Vapor Transmission of Materials, Procedure E, and shall be packaged with an approved desiccant.	OK
The barrier material should be brightly colored to preclude loss within a system.	Vapor-proof barrier material should be colored to contrast with the material on which it is used.	N45.2.2 and NQA-1 use different words but the intent is same.
A3.6.3 Desiccants. Desiccants shall consist of nondeliquescent, nondusting, chemically inert, dehydrating agents.	**3.6.3 Desiccants.** Desiccants shall consist of nondeliquescent, nondusting, chemically inert, dehydrating agents.	OK
The following criteria apply when they are used.	The following criteria shall apply.	OK
(1) When used with austenitic stainless steels, the desiccant and the bag material shall not have a halogen content over 0.25%.	*(b)* When used with austenitic stainless steel and nickel alloy materials, tapes, desiccants, and the materials for the desiccant bag shall not be compounded from or treated with chemical compounds containing elements in such quantities that harmful concentrations are leachable, or they could be released by breakdown under expected environmental conditions and could contribute to intergranular cracking or stress corrosion cracking, such as those containing fluorides, chlorides, sulfur, lead, zinc, copper, and mercury.	N45.2.2 is limited to austenitic stainless steels and specifies that the halogen content shall not be over 0.25% whereas NQA-1 adds "and nickel alloy materials, tapes" and does not provide a specific content level.
The desiccant bag shall be made of puncture, tear and burst resistant material.	*(a)* The desiccant bag shall be made of puncture-, tear-, and burst-resistant material.	OK
(2) The reactivation	(c) The reactivation temperature and	OK

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
temperature and time shall be marked on the desiccant container.	time shall be marked on the desiccant container.	
(3) Canisters used to contain desiccants shall be placed so as to cause no deleterious effects such as galvanic corrosion, even when the desiccant has reached its absorptive capacity for water vapor.	*(d)* Canisters used to contain desiccants shall be placed so as to cause no deleterious effects such as galvanic corrosion, even when the desiccant has reached its absorptive capacity for water vapor.	OK
(4) Desiccant bags and canisters, when used, shall be secured to prevent movement, rupture of the bags, or damage to the item being protected.	(e) Desiccant bags and canisters, when used, shall be secured to prevent movement, rupture of the bags, or damage to the item being protected.	OK
(5) Water-vaporproof flexible barriers shall be used to seal items containing desiccants. The included air volume within the flexible barrier shall be kept to a minimum.	*(f)* Water — and vapor-proof flexible barriers shall be used to seal items containing desiccants. The included air volume within the flexible barrier shall be kept to a minimum.	OK
(6) Items which contain desiccant shall have all openings securely sealed. When flange connections are a part of the barriers, 0-rings or gaskets shall be used with all bolts in place and tightened sufficiently to insure a water-vaporproof seal. Weld end preparations, after capping, shall be covered with a water-vapor proof seal.	*(g)* Items that contain desiccants shall have all openings securely sealed. When flange connections are a part of the barriers, 0-rings or gaskets shall be used with all bolts in place and tightened sufficiently to ensure a water- and vapor-proof seal. Weld end preparations, after capping, shall be covered with a water- and vapor-proof seal.	OK
(7) Packages and items containing desiccant shall be marked. The total number of separate bags and/or containers in the package shall be indicated.	*(h)* Packages and items containing desiccants shall be marked. The total number of separate bags or containers of desiccants in the package shall be indicated.	N45.2.2 uses words "and/or" when detailing bags and containers whereas NQA-1 uses the word "or"
(8) The minimum quantity of desiccant for use in each package shall be determined in accordance with Formula I or Formula II, as applicable.	*(i)* The minimum quantity of desiccant for use in each package shall be determined in accordance with Formula I or Formula II, as applicable.	OK
Formula I: To determine minimum of desiccant for use with other than sealed rigid metal barrier: U= I .6A plus XD.	Formula I To determine minimum units of desiccant for use with other than sealed rigid metal barrier: $U = 1.6A + XD$	OK
Formula II: To determine minimum units of desiccant for use within sealed rigid metal barrier: U= KV plus XD.	Formula II To determine minimum units of desiccant for use with sealed rigid metal barrier: $U = KV + XD$	OK

Enclosure 4, Table 2
ANSI N45.2.2-1972 vs NQA-1-1994, Subpart 2.2

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
In the above formulas: A= Areas of barrier in square feet U= Number of units* of desiccant to be used D=Pounds of dunnage (other than metal) within barrier K= 0.0007 when volume is given in cubic inches K= 1.2 when volume is given in cubic feet V=Volume within barrier in cubic inches or cubic feet X= 8 for hair felt, cellulosic material (including wood) and other material not categorized below X= 6 for bound fibers (animal hair, synthetic fiber or vegetable fiber bound with rubber) X= 2 for glass fiber X= 0.5 for synthetic foams and rubber	where *A* = area of barrier, sq ft (m^2 x 0.0929) *U* = number of units of desiccant to be used (see Note) *D* = dunnage (other than metal) within barrier, lb (kg x 2.2) *K* = 0.0007 when volume is given in cu in. = 1.2 when volume is given in cu ft =0.000042 5 when volume is given in cm^3 (42.5 in m^3) *V* = volume within barrier in cu in. or cu ft (cm^3 or m^3) X = 8 for hair felt, cellulosic material (including wood), and other material not categorized below = 6 for bound fibers (animal hair, synthetic fiber, or vegetable fiber bound with rubber) = 2 for glass fiber = 0.5 for synthetic foams and rubber	NQA-1 added metric equivalents
*A desiccant unit is that quantity of desiccant, as received, which will absorb at equilibrium with air at 25 C at least the following quantities of water vapor: 3.00 grams at 20% relative humidity and 6.00 grams at 40% relative humidity.	NOTE: A *desiccant unit* is that quantity of desiccant, as received, that will absorb at equilibrium with air at 78°F (25°C) at least the following quantities of water vapor: 3.00 g at 20 % relative humidity and 6.00 g at 40% relative humidity.	NQA-1 added English unit equivalent for temperature.
(9) A humidity indicator shall be included in every water-vaporproof envelope containing desiccant. As applicable, the indicator shall be located behind inspection windows or immediately within the closing edge, face, or cover of the barrier, and as far as practical from the nearest unit of desiccant.	*(j)* A humidity indicator shall be included in every water- and vapor-proof envelope containing desiccant. As applicable, the indicator shall be located behind inspection windows or immediately within the closing edge, face, or cover of the barrier and, as far as practical, from the nearest unit of desiccant.	OK
A3.7.1 Fiberboard Boxes. The following criteria apply for fiberboard boxes used as exterior containers:	**3.7.1 Containers** The following criteria shall apply for fiberboard boxes used as exterior containers.	OK
(1) Boxes shall be weather-resistant fiberboard preferably from the following grade types (or compliance symbol): V2 s, V3 s. or V3 c. (Federal Specification PPP-B-636.)	*(1)* Boxes shall be weather-resistant fiberboard preferably from the grade types (or compliance symbol): V2 s, V3 s, or V3 c (Federal Specification PPP-B-636).	OK
(2) Box style shall be RSC — Regular slotted box, (Outer flaps meet, inner flaps and outer flaps are of equal length).	(2) Box style shall be RSC regular slotted box (outer flaps meet, inner flaps and outer flaps are of equal length).	OK
(3) Fiberboard boxes shall be securely closed with a water resistant adhesive applied to the entire area of contact between the flaps. All seams, and joints shall be further sealed with not less than two inch wide, water resistant tape.	*(3)* Fiberboard boxes shall be securely closed with a water-resistant adhesive applied to the entire area of contact between the flaps. All seams and joints shall be further sealed with not less than 2 in. (5 cm) wide, water-resistant tape.	NQA-1 added metric equivalents
(4) Boxes shall be strapped with	*(4)* Boxes shall be strapped with	OK

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
pressure-sensitive reinforced tape, length-wise (top, bottom and ends), girthwide (top, bottom and sides) and horizontal sides and ends.	pressure-sensitive reinforced tape, lengthwise (top, bottom, and ends), girthwise (top, bottom, and sides), and horizontal sides and ends.	
(5) Wood cleating on fiberboard boxes shall be fabricated from sound, well-seasoned lumber.	*(5)* Wood cleating on fiberboard boxes shall be fabricated from sound, well-seasoned lumber.	OK
A3.8.1 Cushioning. Selection of cushioning materials shall be based on the following:	**3.8.1 Cushioning.** Selection of cushioning material shall be based on the following.	OK
(1) It shall exhibit no corrosive effect when in contact with the item being cushioned.	*(a)* It shall exhibit no corrosive effect when in contact with the item being cushioned.	OK
(2) It shall have low moisture content and exhibit low moisture absorption properties; or if the cushioning material has some moisture absorbing capacity, the item shall be protected with a water vapor-proof barrier.	*(b)* It shall have low moisture content and exhibit low moisture absorption properties, or if the cushioning material has some moisture absorbing capacity, the item shall be protected with a water-vaporproof barrier.	OK
(3) It shall have negligible dusting characteristics.	(c) It shall have negligible dusting characteristics.	OK
(4) It shall not readily support combustion.	*(d)* It shall not readily support combustion.	OK
A3.8.3 Anchoring. When bolts are used for anchoring the following criteria shall apply.	**3.8.3 Anchoring.** When bolts are used for anchoring, the following criteria shall apply.	OK
(1) If precision bolt holes in the item are used for anchoring, precaution shall be taken to insure that properly fitting bolts of the correct dimension and characteristics are used to prevent marring or elongation of the holes.	*(a)* If precision bolt holes in the item are used for anchoring, precaution shall be taken to ensure that properly fitting bolts of the correct dimension and characteristics are used to prevent marring or elongation of the holes.	OK
(2) Holes bored through containers or mounting bases shall provide a snug fit.	*(b)* Holes bored through containers or mounting bases shall provide a snug fit.	OK
(3) When mounting items to container bases equipped with skids, bolts shall be extended through the skids whenever practical. In such instances counter-sinking of the bolt in the sliding surface of the skid is necessary.	(c) When mounting items to container bases equipped with skids, bolts shall be extended through the skids whenever practical. In such instances, countersinking of the bolts in the sliding surface of the skid shall be done.	N45.2.2 states that counter-sinking "is necessary" whereas NQA-1 states "shall be done"
(4) Washers shall be used under the nuts to decrease the possibility of the bolt pulling through the wood.	*(d)* Washers shall be used under the nuts to decrease the possibility of the bolt pulling through the wood.	OK
(5) Nuts shall be properly torqued. To prevent their loosening during shipment, lock nuts, lock washers, cotter pins, or staking shall be employed.	(e) Nuts shall be properly tightened. To prevent their loosening during shipment, lock nuts, lock washers, cotter pins, or staking shall be employed.	OK
A3.9 Marking Items shall be marked to preserve identity in accordance with the following criteria:	**3.9 Marking** Items shall be marked to preserve identity in accordance with the following criteria.	OK
(1) The specified identification shall be stamped, etched, stenciled or otherwise marked on the item or on tags to be affixed securely to the item in plain, unobstructed view. When metal stamps are employed, low stress rounded bottom type stamps shall be used when the item proper is	*(a)* The specified identification shall be stamped, etched, stenciled, or otherwise marked on the item or on tags to be affixed securely to the item in plain, unobstructed view. When metal stamps are employed, low stress, rounded bottom type stamps shall be used when the item proper is	NQA-1 added metric equivalents

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
marked. When vibrating marking tools are used they shall be fitted with a *carbide marking tip or equivalent and* shall be designed to provide a rounded impression not to exceed 0.0 10 inches in depth. Etching shall not be used on nickel alloys or on weld areas or sensitized areas of stainless steel. Electric arc marking pencils shall not be used.	marked. When vibrating marking tools are used, they shall be fitted with a *carbide marking tip or its equivalent*, and shall be designed to provide a rounded impression not to exceed 0.010 in. (0.25 mm) in depth. Etching shall not be used on nickel alloys, weld areas, or sensitized areas of stainless steel. Electric-arc marking pencils shall not be used.	
(2) The marking shall not be deleterious to the material nor violate any other section of this standard.	*(b)* The marking shall not be deleterious to the material nor violate any other Section of Subpart 2.2.	OK
(3) When tags are employed, they shall be of a material which will retain the marking, withstand weathering deterioration, and other normal shipping and handling effects and shall not be detrimental to the item.	(c) When tags are employed, they shall be of a material which will retain the marking, withstand weathering deterioration, and other normal shipping and handling effects, and shall not be detrimental to the item.	OK
(4) The English language shall be used. Duplicate marking may be made in other languages.	*(d)* The English language shall be used. Duplicate marking may be made in other languages.	OK
(5) References to weights shall be in avoirdupois units. Duplicate markings in other systems may also be indicated.	(e) References to weights shall be in avoirdupois units. Duplicate markings in other systems may also be indicated.	OK
Markings on the outside container shall be in accordance with the following criteria:	Markings on the outside container shall be in accordance with the following criteria.	OK
(1) Container markings shall appear on a minimum of two sides of the container, preferably on one side and one end.	*(a)* Container markings shall appear on a minimum of two sides of a container, preferably on one side and one end.	OK
(2) The English language shall be used. Duplicate marking may be made in other languages or in pictorial markings according to ISO Recommendation R780 Pictorial Markings For Handling of Goods (general symbols) or ANSI MH6.1.	*(b)* The English language shall be used. Duplicate marking may be made in other languages or in pictorial marking according to ISO Recommendation R780, Pictorial Markings for Handling of Goods (general symbols) or ANSI MH6. 1.	OK
(3) References to weights shall be in avoirdupois units. Duplicate marking in other systems may also be indicated.	(c) References to weights shall be in avoirdupois units. Duplicate markings in other systems may also be indicated.	OK
(4) Container markings shall be applied with waterproof ink or paint in characters no less than 3/4 inch high, container size permitting.	*(d)* Container markings shall be applied with waterproof ink or paint in characters that are legible. When information relative to handling and special instructions is required, such information shall be preceded by the word CAUTION in letters that are at least 1/2 in. (12.7 mm), as permitted by container size.	N45.2.2 details that "characters no less than 3/4 inch high, container size permitting" be used whereas NQA-1 states "in characters that are legible" and then provides additional details on special instructions.
(5) Where tags or labels are used, they shall be affixed to the container using a waterproof adhesive, tacks where practical, or a corrosion resistant wire.	(e) Where tags or labels are used, they shall be affixed to the container using a waterproof adhesive, tacks where practical, or a corrosion-resistant wire.	OK
(6) Container marking shall include the following information:	*(f)* Container markings shall include the following information:	OK
(a) Destination	*(1)* destination	OK
(b) Return address	(2) return address	OK
(c) Package numbers showing the purchase order number, followed	*(3)* package numbers showing the purchase order number, followed by	OK

Enclosure 4, Table 2
ANSI N45.2.2-1972 vs NQA-1-1994, Subpart 2.2

ANSI N45.2.2-1972	NQA-1 (1994) Subpart 2.2 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
by the package number and the total number of packages.	the package number and the total number of packages	
(d) Material identification number	*(4)* material identification number	OK
(e) Handling instructions *Fragile, Center of Gravity, Keep Dry,* This Side Up, Sling Here, Do Not Freeze, stacking limitations as appropriate.	*(5)* handling instructions (e.g., Fragile, *Center of Gravity, Keep Dry, This Side* Up, Sling Here, Do Not Freeze) and stacking limitations, as appropriate	OK
(f) Weight of package (in excess of 100 pounds).	(6) weight of package [in excess of 100 lb (45.5 kg)]	NQA-1 added metric equivalents
(g) Special Instructions. Desiccant Inside, Special Inspection, Storage, Unpacking Restrictions, etc. as appropriate.	*(7)* special instructions (Desiccant Inside, Special Inspection, Storage, Unpacking Restrictions, etc.) as appropriate.	OK
Marking of items not within a container, such as pipe, tanks and heat exchangers, shall exhibit specified information in a location which is in plain unobstructed view, but not directly applied to bare austenitic stainless steel and nickel alloy metal surfaces of the item.	Marking of items not within a container, such as pipe, tanks, and heat exchangers, shall exhibit specified information in a location which is in plain unobstructed view. Marking may be applied directly to bare metal surfaces provided it has been established that the marking material is not deleterious to the item.	N45.2.2 does not allow marking directly on austenitic stainless steel and nickel alloy metal surfaces whereas NQA-1 states that marking is acceptable "provided it has been established that the marking material is not deleterious to the item."

Enclosure 4, Table 3
ANSI N45.2.3-1973 vs NQA-1-1994, Subpart 2.3

ANSI N45.2.3 - 1973	NQA-1 (1994) Subpart 2.3 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
1. INTRODUCTION 1.1 Scope This standard defines the housekeeping requirements for the control of work activities, conditions, and environments that can affect the quality of important parts of a nuclear power plant during the construction phase.	General Subpart 2.3 provides housekeeping requirements for the control of work conditions and environments that can affect the quality of important parts of a nuclear power plant. It supplements the requirements of Part I and shall be used in conjunction with applicable Basic and Supplementary Sections of Part I when and to the extent specified by the organizations invoking Subpart 2.3.	N45.2.3 limited to "during the construction phase" NQA-1 addresses a larger scope of the "nuclear power plant".
These parts include the structures, systems, and components whose satisfactory performance is required for the plant to operate reliably, to prevent accidents that cause undue risk to the health and safety of the public, or to mitigate the consequences of such accidents if they were to occur.	Subpart 2.3 provides housekeeping requirements for the control of work conditions and environments that can affect the quality of important parts of a nuclear power plant. NQA-1 Part II Introduction includes similar language with the same intent: The requirements of this Part (Part II) apply to fabrication, construction, modification, repair, maintenance, and testing activities that affect the quality of structures, systems, and components for nuclear facilities.	Similar Same Intent
Housekeeping encompasses all activities related to control of cleanness of facilities, cleanness of material and equipment, fire prevention and fire protection including disposal of combustible materials and debris, control of access, and protection of equipment not denoted in other standards.		Guidance which defined "housekeeping". Scope and requirements adequately cover the areas identified.
The requirements may also be extended to other appropriate parts of nuclear power plants when specified in contract documents.	NQA-1 Part II Introduction includes similar language with the same intent: To the extent applicable to the activities being performed, the application of this Part (Part II), or portions thereof, and the provisions of Part I, Basic and Supplementary Requirements, shall be specified in written contracts, policies, procedures, or instructions.	Similar Same Intent
This standard is intended to be used in conjunction with ANSI N45.2, Quality Assurance Requirements For Nuclear Power Plants.	To the extent applicable to the activities being performed, the application of this Part (Part II), or portions thereof, and the provisions of Part I, Basic and Supplementary Requirements, shall be specified in written contracts, policies, procedures, or instructions.	Similar Same Intent
1.2 Applicability The requirements of this standard apply to the work of any individual or organization that participates in housekeeping activities during construction activities of nuclear power plants as discussed in paragraph 1 .1.	The requirements of this Part (Part II) apply to fabrication, construction, modification, repair, maintenance, and testing activities that affect the quality of structures, systems, and components for nuclear facilities.	Guidance Only. Wording does not establish requirements.
The extent to which the individual requirements of this standard apply will depend upon the nature and scope of the work to be performed and the importance of the item or service involved.	NQA-1 Part II Introduction includes similar language with the same intent: An appropriate Quality Assurance Program, based on the nature and scope of the work to be performed and the relative importance of the items or services, shall be specified in contractual documents by selective applications of portions of Part I, Basic and Supplemental	Similar Same Intent

Enclosure 4, Table 3
ANSI N45.2.3-1973 vs NQA-1-1994, Subpart 2.3

ANSI N45.2.3 - 1973	NQA-1 (1994) Subpart 2.3 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	Requirements, for programmatic activities and of this Part (Part II) for work oriented activities.	
The requirements are intended to assure that only proper materials, equipment, processes, and procedures arc utilized in the maintenance of housekeeping during the construction of power plants and that the quality of items is not degraded as a result of housekeeping practices and techniques during construction processing.		Guidance Only. Wording does not establish requirements.
1.3 Responsibility The organization or organizations responsible for establishing the applicable requirements for the activities covered by this standard shall be identified and the scope of their responsibilities shall be documented.	NQA-1 Part I, Basic Requirement 1, Organization includes similar words: The organizational structure, functional responsibilities, levels of authority, and lines of communication for activities affecting quality shall be documented.	Similar Same Intent
The work of establishing practices and procedures and providing the resources in terms of personnel, equipment, and services necessary to implement the requirements of this standard may be delegated to other organizations, and such delegations shall also the documented.	NQA-1 Part I, Basic Requirement 1, Organization includes similar words: 2.2 Delegation of Work The individuals(s) or organization(s) responsible for establishing and executing a quality assurance program under this Standard may delegate any or all of the work to others but shall retain responsibility therefor.	Similar Same Intent
However, it is the responsibility of each organization performing work covered by this standard to comply with the procedures and instructions issued for the project and to conform to the requirements of this standard applicable to his work.	NQA-1 Part II Introduction includes similar language with the same intent: The organization upon which this Part (Part II), or portions thereof, is invoked shall be responsible for complying with the specified requirements.	Similar Same Intent
It is the responsibility of the organization performing these activities to specify the detailed methods and procedures unless they are specified in the contract documents.		These words are not included in NQA-1 or the QAPP. Specific provisions regarding organization responsibilities which are applicable to project activities will be defined in associated procedures.
1.4 Definitions The following definition is provided because it is used uniquely in this standard.	NQA-1 Part II Introduction includes similar language with the same intent: 6 DEFINITIONS Definitions unique to the activities described in this Part (Part II) are included in the section dealing with that activity. Definitions generic to quality assurance activities are included in Part I, Supplement S-i, Terms and Definitions.	Similar Same Intent
Construction Phase-The period of time beginning with the start of construction activity and ending as each plant area is turned over to the plant operator.		These words are not included in NQA-1 or the QAPP. Specific provisions regarding this definition which are applicable to project activities will be defined in associated procedures.

Enclosure 4, Table 3
ANSI N45.2.3-1973 vs NQA-1-1994, Subpart 2.3

ANSI N45.2.3 - 1973	NQA-1 (1994) Subpart 2.3 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
Other terms and their definitions are contained in ANSI N45.2.I0.	NQA-1 Part II Introduction includes similar language with the same intent: 6 DEFINITIONS Definitions unique to the activities described in this Part (Part II) are included in the section dealing with that activity. Definitions generic to quality assurance activities are included in Part I, Supplement S-1, Terms and Definitions.	Similar Same Intent
1.5 Referenced Documents Other documents that are required to be included as a part of this standard are either identified at the point of reference or identified in paragraph 5 of this standard.	NQA-1 Part II Introduction includes similar language with the same intent: 7 REFERENCED CODES, STANDARDS, AND SPECIFICATIONS All codes, standards, and specifications that are referenced as a part of this Part (Part II) are listed in the Table entitled "Codes, Standards, and Specifications Referenced in Text."	Similar Same Intent
2. GENERAL REQUIREMENTS This paragraph contains requirements that are to be fulfilled by the contractor who is responsible for performing any segment of work described in paragraphs 3 and 4 of this standard. Measures shall be established and implemented for documenting housekeeping operations to verify conformance to specified requirements.	2 GENERAL REQUIREMENTS Housekeeping activities shall include documented methods and techniques for control of the site area, the plant, and the materials and equipment being incorporated in the plant to preserve the requisite quality of the items being constructed or installed.	Similar Same Intent
2.4 Personnel Qualifications All personnel working in zone controlled areas shall be familiar with the necessities and requirements for cleanness control applicable to the various zones.	Personnel working in zone controlled areas shall be familiar with the necessities and requirements for cleanness control applicable to the various zones.	OK
Training programs shall be utilized for this purpose where appropriate.	Training programs shall be utilized for this purpose, where appropriate.	OK
2.1 Planning The work and the quality assurance requirements for the housekeeping activities at the nuclear power plant site shall be delineated.	NQA-1 Part II Introduction includes similar language with the same intent: A plan shall be developed outlining the work to be performed and the work procedures or instructions required to comply with the requirements of the defined work scope.	Similar Same Intent
The planned activities shall include the methods and techniques for control of the site area, the facilities, and the materials and equipment being incorporated in the plant to preserve the requisite quality of the items being constructed or installed.	2.1 Planning and Procedures Planning and procedure preparation shall be in accordance with the requirements of the Introduction to this Part (Part II); procedures and instructions shall contain sufficient detail to provide for control of the site area, the plant, and the materials and equipment being incorporated in the plant to preserve the requisite quality of the item being constructed or installed.	Similar Same Intent

Enclosure 4, Table 3
ANSI N45.2.3-1973 vs NQA-1-1994, Subpart 2.3

ANSI N45.2.3 - 1973	NQA-1 (1994) Subpart 2.3 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
Necessary procedures and work instructions that are needed to assure compliance with the specified requirements shall be identified and provisions shall be made for their preparation, approval, release, and control.	NQA-1 Part II Introduction includes similar language with the same intent: Installation, inspection, test procedures, and work instructions identified during planning shall be pre-pared. Preparation and approval of the procedures! instructions shall be in advance of the need to use the documents	Similar Same Intent
Methods to be used for the collection, handling, and disposition of records, data, and reports shall be designated.	Basic Requirement 17 Requirements and responsibilities for record transmittal, distribution, retention, maintenance, and disposition shall be established and documented.	OK
2.2 Procedures and Instructions The procedures and instructions for housekeeping practices shall be prepared and may be issued in segments to conform with the project construction schedule.	NQA-1 Part II Introduction includes similar language with the same intent: Installation, inspection, test procedures, and work instructions identified during planning shall be pre-pared.	Similar Same Intent
The first segment establishing regulations for control of site area, site preparation, fire prevention and protection, and records shall be in force with the start of construction activity.	Procedures and instructions providing for the control of site areas, site preparation, fire prevention and protection, and records shall be in force with the start of the construction activity.	Similar Same Intent
The remaining segments shall be prepared and approved no later than the start of equipment installation work.	Other procedures and instructions shall be prepared and approved no later than the start of equipment installation work.	Similar Same Intent
Cleanness requirements for housekeeping activities shall be established on the basis of the following zone designations.	2.2 Classification of Cleaness Cleanness requirements for housekeeping activities shall be established on the basis of the following zone designations.	OK
Time for implementation of the zone designations shall be as required by the construction progress.	The timing for implementation of the zone designations shall be as required by the need for cleanness.	Similar Same Intent
Zones Restriction List I II III IV V Clothing change Yes No No No No Clean gloves, shoe covers, head covering Yes Yes No No No Filtered air Yes No No No No Material precleaning Yes No No No No Material accountability Yes Yes Yes No No Personnel accountability Yes Yes Yes No No No use of tobacco/eating Yes Yes Yes Yes No	Zones Restriction List I II III IV V Clothing change Yes No No No No Clean gloves, shoe covers, head covering Yes Yes No No No Filtered air Yes No No No No Material precleaning Yes Yes No No No Material accountability Yes Yes Yes No No Personnelaccountability Yes Yes Yes No No Use of tobacco or eating Yes Yes Yes Yes No	OK
Zone I— Areas requiring the highest order of cleanness and shall be equipped with a clean clothing change facility at the vestibule or entrance, preferably with toilet facilities immediately adjacent so that personnel working in the controlled area do not have to wear the special clothing in other areas.	Zone I. Areas requiring the highest order of cleanness shall be equipped with a clean clothing change facility at the vestibule or entrance	Similar Same Intent

Enclosure 4, Table 3
ANSI N45.2.3-1973 vs NQA-1-1994, Subpart 2.3

ANSI N45.2.3 - 1973	NQA-1 (1994) Subpart 2.3 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
Such areas shall provide for complete outer change of clothing by personnel, including use of shoe covers, head covers, and gloves to protect all equipment surfaces from outside contamination.	Such areas shall provide for complete outer change of clothing by personnel, including the use of shoe covers, head covers, and gloves to protect all equipment surfaces from outside contamination.	OK
Material entering this zone shall have been appropriately cleaned prior to entry as specified in ANSI N45.2.I.	Material entering this zone shall have been appropriately cleaned prior to entry.	OK
Zone II— Intermediate cleanness requirements less restrictive than Zone I but where foreign matter may have detrimental effects.	Zone II. Intermediate cleanness requirements less restrictive than Zone I, but where foreign matter may have detrimental effects.	OK
Zone III— Areas less restrictive than Zones I and II but requiring access control over personnel and materials.	Zone III. Areas less restrictive than Zones I and II, but requiring access control over personnel and materials.	OK
Zone IV— Areas where it is desired to regulate the use of tobacco and eating for material and equipment protection or for health and fire hazards.	Zone IV. Areas where it is desired to regulate the use of tobacco and eating of food for material and equipment protection or for health and fire hazards.	OK
Zone V—Unrestricted construction areas requiring good construction site housekeeping practices only.	Zone V. Unrestricted construction areas requiring good construction site housekeeping practices only.	OK
For Zones I, II, and III a written record of the entry and exit of all personnel and material shall be established and maintained.	For Zones I, II, and III a written record of the entry and exit of all personnel and material shall be established and maintained.	OK
2.3 Results Inspection and test results shall be documented in a suitable test report or data sheet.	NQA-1 Part I Supplement 10S-1 includes similar language with the same intent: Inspection activities shall be documented and controlled by instructions, procedures, drawings, checklists, travelers, or other appropriate means. NQA-1 Part I Supplement 11S-1 includes *similar language with the same intent:* Test results shall be documented and evaluated by a responsible authority to assure that test requirements have been satisfied.	Similar Same Intent
Each report shall identify the item to which it applies, the procedures or instruction followed in performing the task, and the identification of the following:	NQA-1 Part I Supplement 10S-1 includes similar language with the same intent: Records shall, as a minimum, identify (a) through (f) below: 11S-1 includes similar language with the same intent: 5 Test Records Test records shall, as a minimum, identify (a) through (g) below:	Similar Same Intent

Enclosure 4, Table 3
ANSI N45.2.3-1973 vs NQA-1-1994, Subpart 2.3

ANSI N45.2.3 - 1973	NQA-1 (1994) Subpart 2.3 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
(l) Conditions encountered which were not anticipated, including nonconformance. (2) Identity of inspector or tester. (3) Completion date.	NQA-1 Part I Supplement 10S-1 includes similar language with the same intent: (a) Item inspected (b) date of inspection (c) inspector (d) type of observation (e) results or acceptability (f) reference to information on action taken in connection with nonconformances. 11S-1 includes similar language with the same intent: (a) Item tested (b) date of test (c) tester or data recorder (d) type of observation (e) results or acceptability	Similar Same Intent
Test reports and data sheets shall include an evaluation of the acceptability of inspection and test results and provide for identifying the individual who performed the evaluation.	NQA-1 Part I Supplement 10S-1 includes similar language with the same intent: (a) Item inspected (b) date of inspection (c) inspector (d) type of observation (e) results or acceptability (f) reference to information on action taken in connection with nonconformances. 11S-1 includes similar language with the same intent: (a) Item tested (b) date of test (c) tester or data recorder (d) type of observation (e) results or acceptability	Similar Same Intent
3. REQUIREMENTS	3. Requirements	OK
3.1 Control of Site Area Areas for specific activities shall be assigned and regulated.	3.1 Control of Site Area Areas for specific activities shall be assigned and regulated.	OK
Areas which shall be designated include where appropriate refuse and garbage dumps, refuse burning sites, storage locations, parking lots, eating places, non-smoking areas, subcontractor work areas, common areas, and waste collection container locations.	Areas that shall be designated include, where appropriate, refuse and garbage dumps, refuse burning sites, storage locations, parking lots, eating places, nonsmoking areas, subcontractor work areas, common areas, and waste collection container locations.	OK
Personnel entrance to controlled areas, admission of visitors to the work site, and identification of all personnel shall be regulated in accordance with established procedures and regulations.	Personnel entrance to controlled areas, admission of visitors to the work site; and identification of all personnel shall be controlled in accordance with established procedures and instructions.	Similar Same Intent

Enclosure 4, Table 3
ANSI N45.2.3-1973 vs NQA-1-1994, Subpart 2.3

ANSI N45.2.3 - 1973	NQA-1 (1994) Subpart 2.3 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
Grading. drainage, roads, construction facilities, plant fencing, and utilities shall be provided in accordance with specified requirements and shall he maintained as required in good condition throughout the construction phase or until replaced with the permanent facilities.	Grading, drainage, roads, construction facilities, plant fencing, and utilities shall be provided in accordance with specified requirements and shall be maintained as required in good condition throughout the construction phase or until replaced with the permanent facilities.	OK
3.2 Control of Facilities Control of work and storage areas where important items are handled shall be established and maintained to conform to the appropriate zone defined in paragraph 2.1 of this standard.	3.2 Control of Facilities Control of work and storage areas where important items are handled shall be established and maintained to conform to the appropriate zone defined in para. 2.2 of this Subpart.	OK
Atmospheric control shall be provided where necessary.	Atmospheric control shall be provided where necessary.	OK
The control of all tools, equipment, materials, and supplies that are used in Zones I - II, and III shall be maintained to prevent the inadvertent inclusion of deleterious materials or objects in critical systems	The control of tools, equipment, materials, and supplies that are used in Zones I, II, and III shall be maintained to prevent the inadvertent inclusion of deleterious materials or objects in critical systems.	OK
Appropriate control measures shall be provided through utilization of such items as log books and tethered tools.	Appropriate control measures shall be provided through utilization of such items as log books and tethered tools.	OK
3.2.1 Cleanness The work areas shall be kept sufficiently clean and orderly that construction activity can proceed in an efficient manner that will produce and maintain quality in conformance with specified requirements.	3.2.1 Cleanness. The work areas shall be kept sufficiently clean and orderly so that construction activity can proceed in an efficient manner that will produce and maintain quality in conformance with specified requirements.	OK
Where large accumulations of materials occur on a nonroutine basis, such as the stripping of concrete forms, the material shall be promptly removed or stored neatly.	Where large accumulations of materials occur on a nonroutine basis, such as the stripping of concrete forms, the material shall be promptly removed or stored neatly.	OK
Garbage, trash, scrap, litter, and other excess materials shall be collected, removed from the job site, or disposed of in accordance with specified requirements or planned practices.	Garbage, trash, scrap, litter, and other excess materials shall be collected, removed from the job site, or disposed of in accordance with specified requirements or planned practices.	OK
Such excess material shall not be allowed to accumulate and create conditions that will adversely affect quality.	Such excess material shall not be allowed to accumulate and create conditions that will adversely affect quality.	OK
The disposal of cleaning chemicals shall be accomplished so additional hazards are not created at the disposal site.	The disposal of cleaning chemicals shall be accomplished so additional hazards are not created at the disposal site.	OK

Enclosure 4, Table 3
ANSI N45.2.3-1973 vs NQA-1-1994, Subpart 2.3

ANSI N45.2.3 - 1973	NQA-1 (1994) Subpart 2.3 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
3.2.2 Environment. Areas of activity shall be adequately lighted, ventilated, protected, and accessible as appropriate to the work being performed.	3.2.2 Environment. Areas of activity shall be adequately lighted, ventilated, protected, and accessible as appropriate for the work being performed.	OK
Temporary lighting may be utilized but shall be installed and maintained to provide good visibility.	Temporary lighting may be utilized but shall be installed and maintained to provide good visibility.	OK
Ventilation shall be provided where necessary to prevent accumulation of dust, noxious fumes, and temperature extremes.	Ventilation shall be provided where necessary to prevent accumulation of dust, noxious fumes, and temperature extremes.	OK
Adequate working space for construction personnel shall be provided utilizing proper work stages and platforms having accessibility by stairs or ladders.	Adequate working space for construction personnel shall be provided utilizing proper work scaffolds and platforms having accessibility by stairs or ladders.	OK
Barriers, screens, shields, restricted access, or other protection shall be provided as necessary for isolation of areas where noise, welding arcs, dust, inclement weather, or other conditions exist that may affect the quality of work being performed.	Barriers, screens, shields, restricted access, or other protection shall be provided as necessary for isolation of areas where noise, welding arcs, dust, inclement weather, or other conditions that may affect the quality of work being performed.	OK
3.2.3 Fire Protection and Prevention.	3.2.3 Fire Protection and Prevention.	OK
Equipment and instructions for the protection from, and prevention of, damage by fire shall be provided in accordance with the NEPA National Fire Codes, Volume 4, Building Construction Facilities.	Equipment and instruction for the protection from, and prevention of, damage by fire shall be provided in accordance with the requirements of the NFPA National Fire Codes	Similar Same Intent
Procedures or instructions for fire protection shall include provisions for fighting fires involving the use of available community fire departments, trained project brigades, and others.	Procedures or instructions for fire protection shall include provisions for fighting fires involving the use of available community fire departments, trained project brigades, and others.	OK
Procedures or instructions shall include plans tor provision of water supplies, hydrants, automatic sprinklers, access for fire fighting, and distribution of extinguishers and fire fighting equipment.	Procedures or instructions shall include plans for provision of water supplies, hydrants, automatic sprinklers, access for fire fighting, and distribution of extinguishers and fire fighting equipment.	OK
Fire watches during and immediately following welding operations should be specified.	Fire surveillance during and immediately following operations such as welding and heat treating shall be provided when materials are located such that flames, flying sparks, weld spatter, or excessive heat resulting from the operation could cause combustion, with resulting damage to items of the nuclear plant.	Similar Same Intent
Fire protection facilities shall be in service beginning with the initial stages of permanent construction.	Fire protection facilities shall be in service beginning with the initial stages of permanent construction.	OK
Pre-fire planning should be considered as a requirement of the fire protection procedures or instructions which shall include evacuation of confined areas.	Pre-fire planning shall be conducted as a requirement of the fire protection procedures or instructions, which shall include evacuation of confined areas.	OK

Enclosure 4, Table 3
ANSI N45.2.3-1973 vs NQA-1-1994, Subpart 2.3

ANSI N45.2.3 - 1973	NQA-1 (1994) Subpart 2.3 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
3.3 Materials and Equipment Materials and equipment delivered to the work area shall be placed so that they are accessible but do not hinder construction progress. However, material and equipment shall be so positioned that it will not be damaged by construction activity.	Materials and equipment delivered to the work area shall be so positioned, or protected when necessary, to assure that the quality of the item will not be degraded by the construction activity. Materials and equipment delivered to the work area shall be so positioned, or protected when necessary, to assure that the quality of the item will not be degraded by the construction activity.	Similar. Same Intent
The receiving. storage, and handling activities required by this standard shall be performed as specified in ANSI N45.2.2.	These provisions contained in NQA-1 Subpart 2.2	Similar Same Intent
The cleaning of important parts for the plant that is necessary during these activities shall be performed as specified in ANSI N45 .2. 1.	3.3 Material and Equipment The cleaning of important materials and equipment for the plant that is necessary during receiving, storage, and handling activities shall be in accordance with applicable requirements.	Similar Same Intent
3.4 Construction Tools, Supplies, and Equipment	3.4 Construction Tools, Supplies, and Equipment	OK
The use, location, and deployment of construction tools, supplies, and equipment shall be regulated to keep access and work areas clear and prevent conditions that will adversely affect quality.	The use, location, and deployment of construction tools, supplies, and equipment shall be controlled to keep access and work areas clear and to prevent conditions that will adversely affect quality.	OK
These provisions shall include, but are not limited to such items as the movement of materials to the work area, welding and stress relieving leads, power leads, temporary heating equipment, pumps, air and water hoses, welding machines. air compressors, hoisting equipment, air tools, grinding tools and burning tools.	These provisions shall include, but are not limited to, such items as the movement of materials to the work area, welding and stress relieving leads, power leads, temporary heating equipment, pumps, air and water hoses, welding machines, air compressors, hoisting equipment, air tools, grinding tools, and burning tools.	OK
3.5 Surveillance, Inspections, and Examinations Periodic inspection and examination of the work areas and the construction practices shall be performed at scheduled intervals to assure adequacy of cleanness and housekeeping practices.	3.5 Surveillance and Inspections Periodic inspection of work areas and construction practices shall be performed at scheduled intervals to assure adequacy of cleanness and housekeeping practices.	OK
These inspections and examinations shall include the following as appropriate:	These inspections shall include the following, as appropriate:	OK

Enclosure 4, Table 3
ANSI N45.2.3-1973 vs NQA-1-1994, Subpart 2.3

ANSI N45.2.3 - 1973	NQA-1 (1994) Subpart 2.3 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
(1) Examination of construction site roads, access ways, and ramps for conditions that may result In damage to items being transported or handled. (2) Examination of storage area for conformance to procedures and instructions in the following categories: (a) adequacy of access control. (b) evidence of damage or deterioration. (c) adequacy of protection from fires. weather, movement of equipment, and other factors that may result in damage to stored items. (d) adequacy of solvent storage facilities. (3) Inspection of work areas for maintenance of environmental conditions within specified limits. (4) Surveillance over Installed items to assure the adequacy of: (a) maintenance of protection. (b) preservation of precautionary signs. (c) presrvation of item identity. (d) protection from fire, weather, movement of materials or equipment and other factors which may result in damage to installed items.	(a) inspection of construction site roads, access ways, and ramps for conditions that may result in damage to items being transported or handled; (b) inspection of storage and work areas for conformance to procedures and instructions in the following categories: (1) adequacy of access control (2) evidence of damage or deterioration (3) adequacy of protection from fires, weather, movement of equipment, and other factors that may result in damage to stored and installed items (4) adequacy of hazardous chemicals, paints, and solvent storage facilities (c) inspection of work areas for maintenance of environmental conditions within specified limits; (d) surveillance over installed items to assure the adequacy of: (1) maintenance of protection (2) preservation of precautionary signs (3) preservation of item identity (4) protection from fire, weather, movement of materials or equipment, and other factors which may result in damage to installed items	Similar Same Intent
Where these requirements duplicate the requirements of other standards such as ANSI N45.2.1, duplicate activities and reports are not required.		Guidance Only. Wording does not establish requirements.
4. RECORDS Copies of approved procedures, reports; personnel training and qualification records; controlled zone registry, fire and accident Investigations; and Inspection and examination records shall be prepared and placed with other project records.	4 RECORDS Record copies of procedures, reports, personnel qualification records, zone control registries, fire and accident investigations, surveillance, and inspection records shall be prepared as required in this Part (Part II).	Similar Same Intent
Final disposition of records shall be In accordance with ANSI N45.2.9.	These records shall be retained with other project records as required by code, standard, specification, or project procedures.	Similar Same Intent
5. REVISIONS OF AMERICAN NATIONAL STANDARDS REFERRED TO IN THIS DOCUMENT	NQA-1 Part II Introduction includes similar language with the same intent: 7 REFERENCED CODES, STANDARDS, AND SPECIFICATIONS	Similar Same Intent

Enclosure 4, Table 3
ANSI N45.2.3-1973 vs NQA-1-1994, Subpart 2.3

ANSI N45.2.3 - 1973	NQA-1 (1994) Subpart 2.3 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
When the following standards referred to in this document are superseded by a revision approved by the American National Standards Institute, the revision shall apply. A 10.2-I Q44 Safety Code for Building Construction N45.2 Quality Assurance Program Requirements for Nuclear Power Plants N45.2.I Cleaning of Fluid Systems and Associated Components During the Construction Phase of Nuclear Power Plants N45.2.2 Packaging, Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants (During the Construction Phase N45.2.9 Requirements for Collection, Storage and Maintenance of Quality Assurance Records N45.2.I0 Quality Assurance Terms and Definitions.		No corresponding provision in NQA-1 for addressing revisions is included or required.

Enclosure 4, Table 4
ANSI N45.2.4-1972 vs NQA-1-1994, Subpart 2.4

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording.
	Subpart 2.4 consists of ANSI/IEEE Std. 336-1985, 1 IEEE Standard Installation, Inspection, and Testing Requirements for Power, Instrumentation, and Control Equipment at Nuclear Facilities.	Guidance Only. Wording does not establish requirements.
1. Introduction 1.1 Scope. This standard sets forth the requirements for installation, inspection, and testing of Class I and Class IE electric power, instrumentation, and control equipment and systems during the construction phase of a nuclear power generating station.	1. Introduction 1.1 Scope. This standard sets forth the requirements for installation, inspection, and testing of power, instrumentation, and control equipment and systems during the construction phase of a nuclear facility.	Similar Same intent
	These requirements also cover modifications and those operating phase activities that are comparable in nature and extent to related initial construction activities of the facility.	These words were added in NQA-1
These requirements are intended to assure that only materials and equipment of acceptable quality are incorporated into the plant, that quality is maintained and quality workmanship prevails throughout the construction process, and that completed installations conform to specified requirements, so as to promote public safety, prevent accidents and mitigate the consequences of accidents if they occur, and provide a high degree of plant reliability.		Guidance Only. Wording does not establish requirements.
1.1.1 In addition to the Class I and Class IE systems, the requirements also apply to the following auxiliary equipment that are a part thereof.	The intent of this standard is to establish requirements for safety systems equipment. (Safety systems equipment is defined in IEEE Std 603-1980 [5].') However, this standard may also be applied to non-safety systems equipment.	Similar Same Intent
(1) Connecting cables and raceways (2) Electric and instrumentation containment penetrations (3) Instrumentation sensing lines from the process root valves to and including input transducers (4) Primary sensing devices (for example, orifices, flow nozzles, venturi tubes, and reference columns) (5) Pneumatic instrumentation (6) Output control transducers, including tubing and piping (7) Fluid systems associated with standby generators and transformer cooling systems (8) Switchgear fluid systems (9) Panels, enclosures, and mountings	IEEE Std 603-1980 includes direction and definitions which provide for the determination of the components or elements of a safety system which, when applied would define the equipment that the requirements of subpart 2.4 would apply to. This would include the equipment similar to that listed in N45.2.4.	Similar Same Intent
1.1.2 These requirements may also be extended to other appropriate parts of nuclear power generating stations when specified in contract documents.	NQA-1 Part II Introduction includes similar language with the same intent: To the extent applicable to the activities being performed, the application of this Part (Part II), or portions thereof, and the provisions of Part I, Basic and Supplementary Requirements, shall be specified in written contracts, policies, procedures, or instructions.	Similar Same Intent

Enclosure 4, Table 4
ANSI N45.2.4-1972 vs NQA-1-1994, Subpart 2.4

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording.)
1.1.3 This standard does not set forth specific requirements for the following, though related to the above equipment and systems:	1.1.1 This standard does not set forth specific requirements for the following, though they are related to the above equipment and systems.	OK
(1) Inspection or testing, or both, of welds (2) Cleaning and flushing of instrument sensing lines (3) Aligning or verifying alignment, or both, of Class I rotating equipment (4) Verifying structural integrity of support for Class I or Class IE electric equipment	(1) Installation, inspection, and testing of welds (2) Cleaning and flushing of instrument sensing lines (3) Aligning or verifying alignment, or both, of rotating equipment (4) Verifying structural integrity of supports for equipment (5) Activity governed by Section III of [6] (6) Preoperational tests of the integrated systems and equipment (7) Periodic testing and maintenance after initial operation (8) Receiving inspection and test (9) Non-destructive examination when required	Similar Same Intent Items 5 - 9 added
	1.1.2 During the construction phase and when modifications are being performed, this standard shall be used in conjunction with the applicable portions of ANSI/ASME NQA-1-1983 [1] and ANSI/ASME NQA-2-1983 [2].	Redundant. NQA-1 has incorporated IEEE 336 as Subpart 2.4 of NQA-1.
	During the operations phase this standard shall be used with the applicable portions of ANSI/ANS 3.2-1982 [3].	These words were added in NQA-1 The QAPP and procedures address applicable provisions of ANS 3.2.
For applicable codes on the above refer to Section 9.		Guidance Only. Wording does not establish requirements.
1.2 Applicability. The requirements set forth in this standard apply to the work of any organization that participates in the construction phase of electric and instrumentation equipment and systems from the time that the equipment is turned over to the installers until the time it is integrated into systems in a condition to commence system performance testing.	1.2 Applicability. The requirements set forth in this standard apply to the work of any organization that participates in the installation, inspection, testing, or modification of power, instrumentation, and control equipment and systems in a nuclear facility from the time that the equipment is turned over for installation until it is integrated into a system.	Similar Same Intent
	The extent to which the individual requirements of this standard apply either wholly or in part depends upon the nature and scope of the work to be performed and the importance of the item or service involved.	These words were added in NQA-1
The requirements of this standard are basic minimum requirements which relate to nuclear power generating stations during construction or construction phases of modification or expansion.		Guidance / Informational

Enclosure 4, Table 4
ANSI N45.2.4-1972 vs NQA-1-1994, Subpart 2.4

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording.
For supplementary requirements applicable to the construction phase of multi-unit stations, including expansions to existing stations, refer to Appendix A.	NQA-1 Part II Introduction includes similar language with the same intent: 8 MULTI-UNIT FACILITY PROVISIONS For construction activities in a nuclear power plant where one or more units is already operating or has reached a stage where the fuel has been loaded in the reactor and associated systems energized, the following measures shall be taken in addition to the provisions defined elsewhere in this Part (Part II).	Similar Same Intent
1.3 Responsibility. The organization or organizations responsible for establishing the applicable requirements for the activities covered by this standard shall be identified, and the scope of their responsibility shall be documented.	Basic Requirement 1 The organizational structure, functional responsibilities, levels of authority, and lines of communication for activities affecting quality shall be documented. Supplement 1S-1 3.1 Where more than one organization is involved in the execution of activities covered by this Part (Part 1), the responsibility and authority of each organization shall be clearly established and documented.	OK
	The planning operations stipulated in Section 3.2 shall specify the inspections and tests to be performed on the identified equipment and systems consistent with this standard.	These words were added in NQA-1
The work of establishing practices and procedures and providing the resources in terms of personnel, equipment, and services necessary to implement the requirements of this standard may be delegated to other organizations, and such delegations shall also be documented.	The work of establishing practices and procedures and providing the resources, in terms of personnel, equipment, and services, to implement the requirements of this standard, may be delegated to other organizations. Such delegation shall be documented.	OK
	In any case, the organization invoking this standard shall retain responsibility for overall program effectiveness.	These words were added in NQA-1
It is the responsibility of each organization participating in site construction activities to comply with the procedures and instructions issued for the project.	NQA-1 Part II Introduction includes similar language with the same intent: The organization upon which this Part (Part II), or portions thereof, is invoked shall be responsible for complying with the specified requirements.	Similar Same Intent
1.4 Definitions. The following definitions are provided to assure uniform understanding of select terms as they are used in this standard.	NQA-1 Part II Introduction includes similar language with the same intent: 6 DEFINITIONS Definitions unique to the activities described in this Part (Part II) are included in the section dealing with that activity. Definitions generic to quality assurance activities are included in Part I, Supplement S-i, Terms and Definitions. IEEE 336 also refers to IEEE 603: Safety Systems equipment is defined in IEEE Std 603-1980	Similar Same Intent

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
Class I equipment. Equipment that is essential to the safe shutdown and isolation of the reactor or whose failure or damage could result in significant release of radioactive material.	Defined in IEEE 603-1980	Similar Same Intent
Class IE electric systems. The systems that provide the electric power used to shut down the reactor and limit the release of radioactive material following a design basis event.	Defined within IEEE 603-1980	Similar Same Intent
system performance testing. Tests performed on completed systems, including all their electric, instrumentation, controls, fluid and mechanical subsystems under normal or simulated normal process conditions of temperature, flow, level, pressure, etc.	7.2.2 System Tests Tests shall be made to verify that all parts of a system properly coordinate with each other.	Similar Same Intent
set point. A predetermined level at which a bistable device changes state to indicate that the quantity under surveillance has reached the selected value.		Term now commonly used in the nuclear industry. NQA/IEEE chose not to include them in later revisions of NQA-1 and IEEE-336
lay-up. Idle condition of equipment and systems during and after installation, with protective measures applied as appropriate.		Term now commonly used in the nuclear industry. NQA/IEEE chose not to include them in later revisions of NQA-1 and IEEE-336
1.5 Referenced Documents. Other documents that are required to be included as a part of this standard, as well as the issue or edition of such documents, are either identified at the point of reference or described in Section 9 of this standard.		Guidance Only. Wording does not establish requirements. QAPP identifies applicable reference documents.
2. General Requirements Measures shall be established and implemented for documenting installation, inspection, and testing operations to verify conformance to specified requirements.	3. General Requirements Measures shall be established and implemented for planning and control of installation, inspection, and testing activities to verify conformance to specified requirements.	Similar Same Intent
2.1 Planning. The installation, inspection, and testing activities shall be planned and outlined to define the operations to be used and the systematic, sequential progression of operations for each item or system, the responsibilities of parties concerned for each operation, and the measures employed to preserve the quality of equipment.	3.2 Planning. The installation, inspection, and testing activities shall be performed in accordance with documented plans that define the operations to be used, the systematic, sequential progression of operations for each item or system, the responsibilities of parties concerned for each operation, and the measures employed to preserve the quality of equipment.	OK

Enclosure 4, Table 4
ANSI N45.2.4-1972 vs NQA-1-1994, Subpart 2.4

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording.
Planning shall take into account the need for the preparation and control of procedures and work instructions necessary to comply with the requirements for installation, inspection, and testing of components and systems.	Planning shall take into account the need for the preparation and control of procedures and work instructions necessary to comply with the requirements for installation, inspection, and testing of equipment and systems.	OK
Planning shall include a review of the system and component design specifications and drawings, and of the construction work plans and schedules, to assure that installation, inspection, and testing activities have been incorporated, that they can be accomplished as specified, and that time and resources are sufficient to accomplish the required actions.	Planning shall include a review of the system and equipment specifications and drawings and of the construction work plans and schedules to assure that installation, inspection, and testing activities have been incorporated and that they can be accomplished as specified.	Same except for the omission from NQA-1 of "and that time and resources are sufficient to accomplish the required actions".
2.2 Prerequisites.	3.1 Prerequisites.	OK
The following conditions shall have been met as required by other standards before the requirements set forth in this standard are applied.		Guidance
(1) Qualification of personnel assigned to the construction phase has been in accordance with the requirements of appropriate codes and standards.	3.7 Personnel Qualification. Personnel performing the verifications required by this standard shall be qualified in accordance with an approved quality assurance program.	Similar Same Intent
(2) Systems have been designed and engineered and equipment has been specified in accordance with the published applicable standards and specifically within the frame-work of the Quality Assurance program described in the Safety Analysis Report.		QAPP Section 4.3 invokes Basic Requirement 3 and Supplement 3S-1 which provides for design controls that achieve the same intent.
(3) Materials have been selected, and equipment has been fabricated and shop assembled, in accordance with the specifications and the applicable published codes and standards, the conformance to which has been demonstrated by the manufacturer.		QAPP Section 4.7 invokes Basic Requirement 7 and Supplement 7S-1 which provides for purchasing controls that achieve the same intent.
(4) Materials and equipment have been shipped, received, handled and stored in accordance with the requirements of applicable codes, standards, and manufacturers' recommendations to preserve their integrity and prevent physical, mechanical, and/or electrical damage.		QAPP 4.13 invokes Basic Requirement 13 and Supplement 13S-1 which provides for shipping, handling and receiving controls that achieve the same intent.

Enclosure 4, Table 4
ANSI N45.2.4-1972 vs NQA-1-1994, Subpart 2.4

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording.
(5) The following documents relating to the specific equipment to be installed are available at the construction site:	The following applicable documents relating to the specific equipment to be installed shall be available in legible form at a predetermined retention area or area of usage.	Similar Same Intent
(a) The latest applicable approved-for-construction drawings (b) Installation specifications (c) Manufacturers' instructions (d) Evidence of compliance by manufacturer with purchase requirements, including quality assurance requirements (e) Records of inspections and tests during on-site storage and handling.	(1) The latest applicable approved-for-construction drawings (2) Installation specifications (3) Manufacturers' instructions (4) Evidence of compliance by manufacturer with purchase requirements, including quality documentation (5) Records of inspections and tests during receiving and on-site storage, handling, and maintenance	Similar Same Intent
2.3 Procedures and Instructions. Installation, inspection, and test procedures and work instructions shall be prepared and documented for those activities falling within the scope of this standard.	3.3 Procedures and Instructions. Procedures shall be prepared and documented as determined by the planning in 3.2.	Similar Same Intent
	These procedures and instructions may be in the form of manuals or drawings.	These words were added in NQA-1
These documents shall be kept current and revised as necessary to assure that installation, inspections, and tests are performed in accordance with latest information and shall include as appropriate:	These documents shall be kept current by controlled supervision so that installation, inspections, and tests are performed in accordance with the latest approved design and manufacturers' instructions. The documents shall include or reference:	Similar Same Intent
(1) Installation specifications (2) Inspection and test objectives (3) Precautions to avoid component or sys-tem damage during testing or inspection (4) Inspection and test equipment required (5) Sequence of tests (if applicable) (6) Sequential actions to be followed (7) Frequency of inspection or test (8) Prerequisites (9) Approvals (10) Data report form (11) Identification of test equipment and date of required recalibration where required for interpretation of test results (12) Inspection and test acceptance limits	(1) Installation specifications (2) Inspection and test objectives (3) Precautions to avoid equipment or system damage during installation, testing, or inspection (4) Inspection and test equipment required (5) Sequence of tests (6) Sequential actions to be followed (7) Frequency of inspection or test (8) Test prerequisites (9) Appropriate approvals (10) Suitable form for reporting data (11) Provision for identification of test equipment and date of next required recalibration (where required) for interpretation of test results (12) Inspection and test acceptance limits (13) References (14) Other pertinent items	Similar Same Intent
	The above items shall be included as a check list and shall be marked as required or not appropriate when preparing procedures or instructions.	These words were added in NQA-1
2.4 Results. Inspection and test results shall be documented in a suitable test report or data sheet.	3.4 Results. Inspection and test results shall be documented in a suitable test report or data sheet.	OK
Each report shall identify the item to which it applies, the procedures or instruction followed in performing the task, and the identification of the following:	Each report shall identify the item to which it applies, the procedures or instructions and its revision number used in performing the task, and the identification of the following:	OK

Enclosure 4, Table 4
ANSI N45.2.4-1972 vs NQA-1-1994, Subpart 2.4

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording.
(1) Conditions encountered which were not *anticipated, including nonconformance* (2) Identity of inspector or tester (3) Completion date	(1) Conditions encountered that were not *anticipated, including nonconformance* (2) Identity of inspector or tester (3) Completion date	OK
Test reports and data sheets shall include an evaluation of the acceptability of inspection and test results and provide for identifying the individual who performed the evaluation.	Test reports or data sheets shall include an evaluation of the acceptability of the results and provide for identifying the individual who performed the evaluation.	OK
2.5 Measuring and Test Equipment.	3.5 Measuring and Test Equipment.	OK
2.5.1 Selection. *Inspection and testing equipment with* acceptable accuracy for performing the required function shall be selected	NQA-1 Basic Requirement 12 includes similar language with the same intent: 2 Selection Selection of measuring and test equipment shall be controlled to assure that such times are of proper type, range, accuracy, and tolerance to accomplish the function of determining conformance to specified requirements.	Similar Same Intent
	Measuring and test equipment used to determine compliance with specifications shall be controlled in accordance with the requirements of IEEE Std 498-1985 [4].	These words were added in NQA-1
When general voltage levels, flow directions, or other parameters are checked, an instrument without high precision may be used.	NQA-1 Basic Requirement 12 includes similar language with the same intent: 3.3 Commercial Devices Calibration and control measures may not be required for rulers, tape measures, levels and other such devices, if normal commercial equipment provides adequate accuracy.	Similar Same Intent
When characteristics, efficiencies, capabilities, or other properties are measured to appraise compliance with specifications, the instrument must have adequate accuracy to determine the measured quantity to the precision required by the stated limits of the specifications.	NQA-1 Basic Requirement 12 includes similar language with the same intent: 2 Selection Selection of measuring and test equipment shall be controlled to assure that such items are of *proper type, range, accuracy, and tolerance to* accomplish the function of determining conformance to specified requirements.	Similar Same Intent
Use shall be made of approved industry standards relating to measuring procedures.		These words are not in NQA-1 or the QAPP
Test equipment and/or apparatus supplying electrical, mechanical, or other test inputs shall have adequate capacity and be compatible with items under test so that the results will not be distorted.	NQA-1 Basic Requirement 12 includes similar language with the same intent: 2 Selection Selection of measuring and test equipment shall be controlled to assure that such items are of proper type, range, accuracy, and tolerance to accomplish the function of determining conformance to specified requirements.	Similar Same Intent

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording.
2.5.2 Calibration and Control. Measuring and test equipment used to determine compliance with specifications, shall be adjusted and calibrated at prescribed intervals against certified equipment having known valid relationships to nationally recognized standards.	NQA-1 Basic Requirement 12 includes similar language with the same intent: 3 Calibration and Control 3.1 Calibration Measuring and test equipment shall be calibrated, adjusted, and maintained at prescribed intervals or prior to use, against certified equipment having known valid relationships to nationally recognized standards.	Similar Same Intent
If no national standards exist, the basis for calibration shall be documented.	NQA-1 Basic Requirement 12 includes similar language with the same intent: If no nationally recognized standards exist, the bases for calibration shall be documented.	Similar Same Intent
Records of the calibrations shall be maintained and equipment suitably marked to indicate date of next required calibration.	NQA-1 Basic Requirement 12 includes similar language with the same intent: 5 Records Records shall be maintained and equipment shall be suitably marked to indicate calibration status.	Similar Same Intent
When inspection and testing equipment are found to be out of calibration, an evaluation shall be made of the validity of previous inspection or test results and of the acceptability of items previously inspected or tested.	NQA-1 Basic Requirement 12 includes similar language with the same intent: When inspection and testing equipment are found to be out of calibration, an evaluation shall be made and documented of the validity of previous inspection or test results and of the acceptability of items previously inspected or tested.	Similar Same Intent
Test equipment found to be out of calibration shall be clearly identified as such.	NQA-1 Basic Requirement 12 includes similar language with the same intent: Out-of-calibration devices shall be tagged or segregated ...	Similar Same Intent
2.6 Nonconforming Items. Defects, deficiencies, discrepancies, or other nonconforming situations shall be resolved in accordance with established procedures.	3.6 Nonconforming Items. Defects, deficiencies, discrepancies, or other nonconforming situations shall be resolved in accordance with established procedures.	OK
These procedures shall provide for identifying, documenting, and obtaining authorization for resolving each nonconforming situation.	These procedures shall provide for identifying, documenting, and obtaining authorization for resolving each nonconforming situation.	OK
3. Preconstruction Verification While it is recognized that the requirements for initial receipt inspections and storage are covered by another standard, it is necessary to verify that the quality of an item has not suffered during the interim period.	4. Preinstallation Verification Verifications shall be performed just prior to installation.	Similar Same Intent
It is not intended to duplicate inspections but rather to verify that items are in a satisfactory condition for installation.		Guidance / Information
The verifications shall include:	(1) The following, relating to the specific equipment to be installed, shall be available at the construction site in legible form:	Similar Same Intent

Enclosure 4, Table 4
ANSI N45.2.4-1972 vs NQA-1-1994, Subpart 2.4

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording.
(1) Verification that materials and equipment received by the installers are identified in accordance with the latest approved-for-construction drawings, equipment lists, and specifications (2) Verification that approved procedures, instruction manuals, and/or any special work instructions if required for specific equipment are available (3) Checking of records of protective measures maintained during storage for conformance to storage requirements (4) Visual examination of materials and equipment to assure physical integrity such as absence of physical damage, rust or corrosion, contact contamination, and condensation	(a) The latest applicable approved-for-construction drawings (b) Installation specifications, procedures, or any special work instructions (2) Identification of materials and equipment in accordance with the latest approved-for-construction drawings, equipment lists, and specifications (3) Documentation of protective measures taken during storage (4) Physical integrity by visual examination of materials and equipment for damage, corrosion, contamination, and condensation.	Similar Same Intent
Equipment shall be located, installed, assembled, and/or connected in strict accordance with the following as applicable:	5.1 Equipment Placement. Equipment shall be located, installed, assembled, and connected in strict accordance with the following:	Similar Same Intent
(1) Latest approved-for-construction drawings (2) Manufacturers' instructions (3) Installation specifications and procedures	1) Latest approved-for-construction drawings (2) Installation specifications and procedures, where required by the planning of 3.2	Similar Same Intent NQA-1 omitted "(2) Manufacturers' instructions"
Care shall be especially exercised in following the provisions of the above documents for operations such as:	5.2 Precautions. Care shall be exercised in following the provisions of the documents listed in 5.1 for operations such as:	Similar Same Intent
(1) Cable pulling (2) Cable splicing (3) Cable terminating (4) Cable routing including maintaining required separation between redundant systems (5) Tagging and/or identifying various items including cable (6) Installing electric and instrumentation penetration assemblies and assuring the integrity of the containment seals	(1) Cable pulling (2) Cable splicing (3) Cable terminating (4) Cable and instrument sensing line routing, including maintenance of required separation between redundant systems (5) Tagging or identifying, or both, various items, including cable, and temporary conditions (6) Installing electric and instrumentation penetration assemblies and assuring the integrity of the containment seals (7) Installation of fire stops and fire barriers (8) Installation of instrumentation piping or tubing - (9) Mounting and supporting of equipment (10) Removal of temporary shipping supports and holddown bolts (11) Installation of environmental and pressure seals	Similar Same Intent Items 7 - 10 added in NQA-1
5. Verification During Construction	6. Verification During Installation	Similar Same Intent
5.1 Inspections. Surveillance of construction activities shall include inspections of the work areas and the work in progress to assure conformance to applicable requirements.	Verification during installation shall include inspections and tests performed in accordance with the QA program requirements.	Similar Same Intent
Inspections shall include the following, as appropriate:	6.1 Inspections. Inspections performed during installation shall include the following.	Similar Same Intent

Enclosure 4, Table 4
ANSI N45.2.4-1972 vs NQA-1-1994, Subpart 2.4

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording.
5.1.1 Inspections to Verify Correctness of Installation. Inspection shall be made to verify that equipment is being located, installed, assembled, and/or connected to comply with latest approved-for-construction drawings, manufacturers' instructions, and installation specifications.	6.1.1 Inspections to Verify Correctness of Installation. Inspections shall be performed to verify that equipment is being located, installed, assembled, and connected to comply with latest approved-for-construction drawings and installation specifications and procedures.	Similar Same Intent
Such inspections shall include, as appropriate, verification of:	Inspections shall include such items as verification of:	OK
(1) Leveling and alignment (2) Clearances and tolerances (3) Proper location and routing of cables and sensing lines (4) Tightness of connections and fastenings (5) Freedom of movement (6) Correct polarity (7) Proper grounding (8) Terminations (9) Fluid levels and pressures (10) Absence of leaks (11) Physical integrity (12) Identifications	(I) Leveling and alignment (nonrotating equipment) (2) Clearances and tolerances (3) Location, support, and routing of cables and sensing lines (4) Tightness of connections and fastenings and use of proper tools (5) Freedom of movement (6) Polarity (7) Grounding and shielding (8) Terminations (9) Fluid levels and pressures (10) Absence of leaks (11) Physical integrity (12) Identifications (13) Circuit fusing (14) Equipment rating (15) Fire stops and fire barriers (16) Installation of mountings and supports (17) Lubrication of bearings (18) Environmental and pressure seals	Similar Same Intent Items 13 - 18 added in NQA-1
5.1.2 Inspections to Verify Housekeeping. Inspections shall be made to verify adequacy of housekeeping in work areas.	6.1.2 Inspections to Verify Housekeeping and Protective Measures. Inspections shall be performed to verify the adequacy of housekeeping in work areas [2].	OK
	Inspections shall be performed on a regular schedule and properly documented to verify that the following protective measures are adequate.	These words were added in NQA-1
	(1) Protective measures applied for lay-up during construction are in accordance with procedures or specifications	These words were added in NQA-1
Adequacy of barriers and protective covers shall be evaluated to assure that items will not be damaged as a result of adjacent construction activity.	(2) Protective measures to prevent damage as a result of adjacent activity	Similar
Adequacy of protective measures shall be evaluated to assure that equipment being used for testing will not be damaged.	(3) Protective measures to prevent damage to measuring and test equipment during field use	Similar
5.1.3 Inspection of Temporary Conditions.	6.1.3 Inspections of Temporary Conditions.	OK

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
Inspections shall be made to verify adequacy of protective measures applied for layup during construction. All temporary connections, such as jumpers and bypass lines, and temporary set points of control equipment shall be clearly identified and documented so that subsequent restoration can be ascertained prior to placing the item in service.	(1) Protective measures applied for lay-up during construction are in accordance with procedures or specifications Inspections shall be performed to verify that all temporary connections, such as jumpers and bypass lines and temporary setpoints of control equipment, are clearly identified and documented so that subsequent restoration can be ascertained prior to placing the item in service.	Similar Same Intent
5.2 Tests.	6.2 Tests.	OK
Surveillance of construction activities shall include tests performed in accordance with written test procedures to verify that items being installed comply with specified quality and performance requirements. These tests should be performed at appropriate points in the construction phase as access permits or when questions arise as to the quality of components or workmanship. Where preliminary operation of equipment, during construction, is utilized for a testing function, the purpose of the test, its scope, and results shall be clearly established and documented. Tests shall be repeated if construction or associated activity affects the results of the tests. The need to repeat a test shall be ascertained at the time of preparing for post-construction testing in accordance with 6.2. Tests during construction shall include the following:	NQA-1 Part II Introduction includes similar language with the same intent: Installation, inspection, test procedures, and work instructions identified during planning shall be prepared. When these tests serve as a prerequisite or a part of the test of the completed system, a review of construction activity that may have affected the results shall be made. Manufacturers' tests on fabricated items may be accepted for equipment not disturbed during the construction phase. Tests performed during installation shall be those specified in the planning in 3.2 and shall include a selection of the following.	Similar Same Intent
5.2.1 Electrical Tests.	6.2.1 Electrical Tests	OK
The following electrical tests shall be performed:		Editorial difference. Same effect
(1) tests to ascertain circuit continuity, absence of short circuits, correct polarity and correct direction of rotation (2) Tests to ascertain proper functioning of systems, including indicating meters, recorders, transducers, targets and lamps, annunciators and alarms, controls and interlocks (3) Voltage breakdown tests on liquid insulation (4) Overpotential tests as specified (5) Insulation resistance measurements as specified	(1) Tests to ascertain circuit continuity, absence of improper grounds and short circuits, correct polarity and correct direction of rotation. (2) Tests to ascertain proper phasing and functioning of equipment, including indicating meters, recorders, transducers, targets and lamps, annunciators and alarms, controls, interlocks, protective relays and breakers (3) Voltage breakdown tests on fluid insulation (4) Overpotential tests as specified (5) Insulation resistance measurements as specified	Similar Same Intent "Protective relays and breakers" added to item 2
When overpotential tests are performed, the values shall conform to the applicable codes and standards. The manufacturers' recommendations shall always be considered.	When overpotential tests are performed, the manufacturers' recommendations shall be considered.	Similar Same Intent

Enclosure 4, Table 4
ANSI N45.2.4-1972 vs NQA-1-1994, Subpart 2.4

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording.)
5.2.2 Mechanical Tests. Mechanical tests shall be performed to ascertain that electric and/or instrumentation components or systems can withstand systems pressure ratings. As a minimum, such tests shall be applied to pressure sensing and transmitting devices operating in steam, hydraulic, and vacuum systems and their hydraulic or pneumatic interconnecting piping or tubing and associated instruments.	6.2.3 Mechanical Tests. Leak or flow tests shall be performed to demonstrate the operation of electric instrumentation equipment or systems. As a minimum, such tests shall be applied to pressure sensing and transmitting devices operating in steam, hydraulic, or pneumatic interconnecting piping or tubing and associated instruments to ascertain that they can withstand systems pressure ratings.	Similar Same Intent
Pressurized equipment which is a part of electric apparatus such as heat exchangers, circulating systems, actuating systems, and electric and instrumentation containment penetrations shall likewise be tested if site assembled or fabricated.	Pressurized equipment that is a part of electric apparatus, such as heat exchangers, circulating systems, actuating systems, and electric and instrumentation containment penetrations, shall be tested.	Similar Same Intent
Manufacturers' tests on fabricated items may be accepted for equipment not disturbed during the construction phase.	6.2 Tests. Manufacturers' tests on fabricated items may be accepted for equipment not disturbed during the construction phase.	OK
These tests shall be in accordance with the applicable codes and standards.	(3.2) Planning shall take into account the need for the preparation and control of procedures and work instructions necessary to comply with the requirements for installation, inspection, and testing of equipment and systems.	Planning per 3.2 establishes appropriate requirements
If equipment is assembled at the construction site, tests shall be conducted after the assembly is complete even though the components may have been previously tested.	(1.2) . The requirements set forth in this standard apply to the work of any organization that participates in the installation, inspection, testing, or modification of power, instrumentation, and control equipment and systems in a nuclear facility from the time that the equipment is turned over for installation until it is integrated into a system.	Applicability of this part is to activities related to final installation and construction
5.2.3 Physical and Chemical Tests. These tests shall include, as appropriate:	6.2.2 Physical and Chemical Tests	Similar Same Intent
(1) Chemical analyzing of fluids for oxygen or moisture content and purity (2) Radiation sensitivity testing to confirm that radiation sensors and controlling devices are properly functioning	(1) Chemical analysis of fluids for oxygen or moisture content and purity (2) Radiation testing to confirm that radiation sensors and controlling devices are properly functioning.	OK
These tests shall be in accordance with the applicable codes in Appendix B.		Planning per 3.2 establishes appropriate requirements
6. Post-Construction Verification 6.1 Inspections. Installed equipment and systems shall be inspected to verify the following:	7. Post-Installation Verification 7.1 Inspections. Installed equipment and systems shall be inspected to verify that:	OK

Enclosure 4, Table 4
ANSI N45.2.4-1972 vs NQA-1-1994, Subpart 2.4

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording.
(1) That equipment and materials have not sustained damage during installation (2) That good and proper workmanship has prevailed (3) That the installation has been made in accordance with specified requirements (4) That all nonconforming items have been satisfactorily resolved (5) That appropriate protective measures are applied for lay-up after installation	(1) Equipment and materials have not sustained damage during installation (2) Good and proper workmanship has prevailed (3) The installation has been made in accordance with specified requirements (4) All nonconforming items have been satisfactorily resolved (5) Appropriate protective measures are applied for lay-up after installation	OK
(6) That all temporary conditions such as jumpers, bypass lines, and temporary set points have been clearly identified so that subsequent restoration can be ascertained prior to placing the items in service	(6) All temporary conditions, such as jumpers, lifted leads, bypass lines, and temporary set-points, have been clearly identified so that subsequent restoration can be ascertained prior to placing the items in service.	OK
To satisfy the above objectives, inspections defined in 5.1 shall be repeated, as appropriate-ate.	To satisfy the above objectives, it may be necessary to repeat some of the inspections defined in 6.1.	Similar Same Intent
6.2 Tests. Installed equipment and systems shall be tested to demonstrate that the installation has been made in accordance with design requirements and that the operation gives the desired result.	7.2 Tests. Installed equipment and systems shall be tested to demonstrate that they have been installed in accordance with design requirements and that the operation gives the desired result.	OK
Temporary electrical connections, temporary piping sections, abnormal chemical solutions, unspecified setting of devices, the fixing of a moving component, or the effecting of any other abnormality if made previously shall be rectified before final testing except in cases where fuel loading or other critical operations prevent using the complete assembly for the test.	Temporary electrical connections, temporary piping sections, abnormal chemical solutions, unspecified setting of devices, the temporary blocking or the effecting of any other abnormality previously made shall be rectified before final testing except in cases where fuel loading or other operations prevent using the complete assembly for the test.	OK
In these instances, a documented notice shall be prepared stating the substitutions that existed for the test.	In these instances, a documented notice stating the temporary test conditions shall be prepared and be referenced to the appropriate test report or data sheet.	Similar Same Intent
In final testing that precedes system performance testing, normal system readout devices and installed transducers shall be used as far as possible to monitor the operation.	In final testing that precedes preoperational testing, normal system readout devices and installed transducers shall be used as far as possible to monitor the operation.	OK
Where the installed equipment is not adequate for the purpose of conducting tests, special measuring instruments and simulating devices shall be used.	Where the installed equipment is not adequate for the purpose of conducting tests, special measuring instruments and simulating devices shall be used.	OK
Test equipment used shall have adequate capacity and be compatible with system under test so that the results will not be distorted.	Test equipment used shall have adequate capacity and tolerance and be compatible with the system under test.	Similar Same Intent
6.2.1 Equipment Tests. Tests shall be performed to verify that the quality of installed equipment has not deteriorated during the construction phase.	7.2.1 Equipment Tests. Tests shall be performed to demonstrate that the installed equipment is in an acceptable condition to be energized where manufacturers' tests or calibrations cannot be accepted (see 6.2).	Similar Same Intent

Enclosure 4, Table 4
ANSI N45.2.4-1972 vs NQA-1-1994, Subpart 2.4

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording.
Tests and shakedown runs shall be made on energized systems where necessary to evaluate operations and to properly condition for service (for example, the seating of brushes or bearings, the stabilization of instrumentation and burn-in of electronic devices).	Tests and shakedown runs shall be made on energized systems where necessary to evaluate operation and to properly condition for service (for example, the seating of brushes or bearings, the stabilization of instrumentation and burn-in of electronic devices).	OK
Tests shall be made to assure that instrumentation and control channels are properly calibrated.	Tests shall be made to assure that instrumentation and control channels are properly calibrated.	OK
In addition, specific tests shall be made at critical levels such as "set points" in a manner simulating the approach toward the set point.		Properly calibrated and proper operation imply operating correctly at the "set points"
These calibrations shall be made with these devices in their normal positions if the calibration is dependent upon location or attitude.	If the calibration is dependent upon location or orientation, then calibrations shall be made with these devices in their normal positions.	Similar Same Intent
Tests shall be made to determine that proper response is obtained over the operating range of the device.	Tests shall be made to determine that proper operation is obtained over the range of the device.	Similar Same Intent
Particular attention shall be given to verifying independence and dependence, as appropriate, of the elements of the systems.	Particular attention shall be given to verifying independence and dependence, as appropriate, of the elements of the systems.	OK
Items requiring calibration shall be tagged or labeled on completion indicating date of calibration and identity of person that performed the calibration.	Items requiring calibration shall be identified by tags or labels indicating the identity of the person who performed the calibration and the date of the next required calibration.	Similar Same Intent
6.2.2 System Tests. These tests shall be made to verify that all parts of a system properly coordinate with each other.	7.2.2 System Tests. Tests shall be made to verify that all parts of a system properly coordinate with each other.	OK
Tests shall be made with attention given to demonstrating required independence and dependence of subsystems.	Tests shall be made with attention given to demonstrating required independence and dependence of subsystems.	OK
Consideration shall be given to demonstrating freedom from unwanted or harmful effects of conducted or induced electrical noise.	Consideration shall be given to the need for demonstrating freedom from unwanted or harmful effects of conducted or induced electrical noise.	Similar Same Intent
A review shall be made of all testing that has preceded the final integrated system testing including both the tests made on assemblies and components with particular attention given to those that demonstrate functional or operational results.	A review shall be made of testing that has preceded the final integrated system testing, including the tests made on equipment with particular attention given to those that demonstrate functional or operational results.	OK
When these tests serve as a prerequisite or a part of the final system test, a review of construction activity which may have affected the results shall be made.	When these tests serve as a prerequisite or a part of the test of the completed system, a review of construction activity that may have affected the results shall be made.	OK

Enclosure 4, Table 4
ANSI N45.2.4-1972 vs NQA-1-1994, Subpart 2.4

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording.
The final construction-phase testing shall be made with all assemblies and components of subsystems complete except where a critical operation requires that temporary electrical connections, piping sections, or structural supports be installed to make the tests.	The final construction-phase testing shall be made with all equipment of subsystems complete except where an operation requires that temporary electrical connections, piping sections, or structural supports be installed to make the tests.	Similar Same Intent
7. Data Analysis and Evaluation Procedures shall be established for processing inspection and test data and their analysis and evaluation.	8. Data Analysis and Evaluation Procedures shall be established for processing inspection results and analyzing and evaluating test data.	Similar Same Intent
These procedures shall include acquisition and reduction of inspection and test data for prompt evaluation against acceptance criteria, operating limits and performance standards.	These procedures shall include requirements for reduction of inspection and test data for review or evaluation against acceptance criteria.	Similar Same Intent
The data processing procedures shall provide for "on-the-spot" evaluation to determine the validity of the inspection and test results, the appropriateness of continuing the inspection or test.		These words are not in NQA-1 or the QAPP. Applicable requirements will be addressed in associated procedures to the extent necessary for the project
The data shall be analyzed and evaluated to verify completeness of results, achievement of inspection and test objectives, and operational proficiency of equipment and systems; to identify additional inspection and/or tests required; and to identify necessary changes to the installation inspection or test procedures	The data shall be analyzed and evaluated to verify completeness, achievement of objectives, and correct operation of equipment and systems, and to identify any additional inspection or tests required.	Similar Same Intent
Inspection and test results that include inspection and test data, together with a report of data analysis and evaluation, shall be provided as specified in Section 8.	3.4 Results. Inspection and test results shall be documented in a suitable test report or data sheet. Each report shall identify the item to which it applies, the procedures or instructions and its revision number used in performing the task, and the identification of the following: (1) Conditions encountered that were not anticipated, including nonconformance (2) Identity of inspector or tester (3) Completion date Test reports or data sheets shall include an evaluation of the acceptability of the results and provide for identifying the individual who performed the evaluation.	Similar Same Intent
8. Records Record copies of completed procedures, reports, personnel qualification records, test equipment calibration records, test deviation or exception records, and inspection and examination records shall be prepared.	9 Records Copies of construction records such as approved procedures, personnel qualifications, test equipment calibration records, deviation or exception records, and inspection and test records shall be prepared.	Similar Same Intent
These shall be placed with other project records as required by code, standard, specification, or project procedures.	These shall be placed with other project records as required by code, standard, specification, or project procedures.	OK

Enclosure 4, Table 4
ANSI N45.2.4-1972 vs NQA-1-1994, Subpart 2.4

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording.
9. Applicable Codes, Standards, and Guides The applicable published codes, standards, and guides shall be used.	2. References	Applicable requirements encompassed by NQA-1 are incorporated in the QAPP and associated procedures to the extent necessary for the project.
In cases where codes or standards were intended to cover the manufacturing phase of an item, these codes shall be used as guides.		Applicable requirements encompassed by NQA-1 are incorporated in the QAPP and associated procedures to the extent necessary for the project.
Refer to Appendix B for a listing, not necessarily complete, of additional codes, standards, and guides that should be considered during the construction phase.	NQA-1 Part II Introduction includes similar language with the same intent: 7 REFERENCED CODES, STANDARDS, AND SPECIFICATIONS All codes, standards, and specifications that are referenced as a part of this Part (Part II) are listed in the Table entitled "Codes, Standards, and Specifications Referenced in Text."	Similar Same Intent
The following guides or standards refer specifically to nuclear power generating stations and their construction, and shall be considered applicable.		Applicable requirements encompassed by NQA-1 are incorporated in the QAPP and associated procedures to the extent necessary for the project.
	When the following standards referred to in this document are superseded by a revision approved by the American National Standards Institute, the revision is not mandatory until it has been incorporated as part of this standard.	Applicable requirements encompassed by NQA-1 are incorporated in the QAPP and associated procedures to the extent necessary for the project.

Enclosure 4, Table 4
ANSI N45.2.4-1972 vs NQA-1-1994, Subpart 2.4

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
(1) IEEE Std 279-1971, Criteria for Protection Systems for Nuclear Power Generating Stations (2) IEEE Std 308-1971, Criteria for Class IE Electric Systems for Nuclear Power Generating Stations (3) IEEE Std 317-1971, Electric Penetration Assemblies in Containment Structures for Nuclear Fueled Power Generating Stations (4) IEEE Std 323-1971, Guide for Qualification of Class I Electric Equipment for Nuclear Power Generating Stations (5) ANSI 18.2-1965, Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants (6) ANSI B31.7-1969, Nuclear Power Piping (7) IEEE Std 334-1971, Guide for Type Tests of Continuous-Duty Class I Motors Installed Inside the Containment of Nuclear Power Generating Stations (8) IEEE Std 336-1971, Installation, Inspection and Testing Requirements for Instrumentation and Electric Equipment During the Construction of Nuclear Power Generating Stations (9) IEEE Std 338-1971, Trial-Use Criteria for the Periodic Testing of Nuclear Power Generating Station Protection Systems (10) IEEE Std 344-1971, Trial-Use Guide for Seismic Qualification of Class I Electric Equipment for Nuclear Power Generating Stations		Specific provisions of Subpart 2.4 which are applicable to project activities will be defined in associated procedures.
	[1] ANSI/ASME NQA-I-1983, Quality Assurance Program Requirements for Nuclear Power Plants.2 [2] ANSI/ASME NQA-2-1983, Quality Assurance Requirements for Nuclear Power Plants. [3] ANSI/ANS 3.2-1982, Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants. [4] IEEE Std 498-1985, IEEE Standard Requirements for the Calibration and Control of Measuring and Test Equipment Used in the Construction and Maintenance of Nuclear Power Generating Stations. [5] IEEE Std 603-1980, IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations. [6] 1984 ASME Boiler and Pressure Vessel Code.	Specific provisions of Subpart 2.4 which are applicable to project activities will be defined in associated procedures.

Enclosure 4, Table 4
ANSI N45.2.4-1972 vs NQA-1-1994, Subpart 2.4

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording.)
(These Appendixes are not a part of IEEE Standard Installation. Inspection, and Testing Requirements for Instrumentation and Electric Equipment During the Construction of Nuclear Power Generating Stations.) Appendix A Supplementary Provisions for Multi-Unit Stations For construction activity in nuclear power generating stations where one or more units are already operating or have reached a stage in their own construction where the fuel has been loaded in the reactor and associated systems energized for whatever purpose, the following measures shall be taken in addition to the provision defined in the body of this document.	10. Supplementary Provisions for Multiunit Stations and Operating Plants For construction activity in nuclear facilities where one or more units are already operating or have reached a stage in their construction where the fuel has been loaded in the reactor and associated systems energized for whatever purpose, the following measures shall be taken in addition to the provisions defined elsewhere in this standard.	Similar Same Intent
Al. Planning and Preparation Instructions, procedures or drawings shall be prepared to control installation, inspection and testing activities at areas of interface between the new and existing units. These instructions and procedures or drawings shall define: (1) The areas of interface between the new and existing units (2) Access control and authority for work at these interface areas (3) Nature of potential hazards to and/or from the existing equipment (4) Precautions required to be taken during installation (5) Supplementary objectives for inspection and testing	10.1 Planning and Preparation. Instructions, procedures, or drawings shall be prepared to control installation, inspection, and testing activities at areas of interface between the new and existing units. These instructions and procedures or drawings shall define the following: (1) The areas of interface between the new and existing units - (2) Access control and authority for work at these interface areas (3) Nature of potential hazards to or from the existing equipment (4) Precautions required to be taken during installation (5) Supplementary objectives for inspection and testing	OK
A2. Documentation A2.1 The instructions, procedures or drawings described in Section Al shall be documented and shall be kept current by revisions as necessary.	10.2 Documentation 10.2.1 The instructions, procedures, or drawings described in 10.1 shall be kept current by revisions.	Similar Same Intent "documented" and "as necessary" are omitted from NQA-1

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
A2.2 The equipment and/or systems which are associated with existing unit(s) that are electrically energized or charged with pressurized and/or radioactive fluids and which are in the vicinity of the construction activity associated with the new unit shall be properly tagged or identified.	10.2.2 The equipment or systems which are associated with existing unit(s) that are electrically energized or charged with pressurized or radioactive fluids and which are in the vicinity of the construction activity associated with the new unit shall be properly tagged or identified.	OK
A2.3 The documentation associated with installation described in Section 2.2 of the main document shall additionally include: A2.3.i The identification of the equipment and/or system defined in 2.2 above, which poses a potential hazard in the vicinity of current construction activity. A2.3.2 Level of potential hazard from such neighboring energized systems, such as: voltage, radiation level, fluid pressure and/or temperatures.	10.2.3 The documentation associated with installation described in 10.2.2 shall also include: (1) The identification of the equipment or sys-tem defined in 10.2.2 which poses a potential hazard in the vicinity of current construction activity (2) Identification of the potential hazard of such neighboring energized systems as voltage, radiation level, fluid pressure, or temperatures	OK
A2.4 Authorizations for access to and work at the areas of interface between the new and existing units shall be documented.	10.2.4 Authorizations for access to and work at the areas of interface between the new and existing units shall be documented.	OK
	10.2.5 Provisions of Section 9 shall be implemented to supplement or supersede documents or records as required.	These words were added in NQA-1
A3. Installation A3.1 Suitable protective barriers shall be erected to prevent damage to equipment and/or systems associated with the existing unit(s).	10.3.1 Suitable protective barriers shall be erected where needed, to prevent damage to equipment or systems associated with the existing unit(s).	OK
A3.2 Spare capacities available in existing facility such as in cable raceways or in panelboards shall not be used unless expressly indicated on the latest applicable approved-for-construction drawings or installation specification.	10.3.2 Spare capacities available in the existing facility, such as in cable raceways or in panelboards, shall not be used unless expressly indicated on the latest applicable approved-for-construction drawings or installation specification.	OK

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	This does not prohibit authorized temporary use of such spare capacities.	These words were added in NQA-1
A3.3 When working in an area common to the new and the existing units, such as the cable spreading room, control room, radio-active waste building or the battery room, care shall *be especially exercised to avoid interference* with existing facilities and to maintain required separation, where appropriate, between the systems associated with existing and new units.	10.3.3 When working in an area common to the new and the existing units, such as the cable spreading room, control room, or radioactive waste building, care shall be especially exercised *to avoid interference with existing facilities and to* maintain required separation, where appropriate, between the systems associated with existing and new units.	OK
A4. Inspection A4.1 Inspection shall be performed to verify that existing equipment and/or systems neighboring current construction activity are properly tagged and identified, and potential hazards therefrom identified and documented.	10.4 Inspection 10.4.1 Inspection shall be performed to verify that the requirements of 10.2 and 10.3 have been satisfied.	Similar Same Intent
A4.2 Inspection shall be performed to verify that the existing facilities are properly protected from current construction activity.	10.4.2 Inspection shall be performed to verify that the existing facilities are properly protected from construction activity.	OK
A5. Testing A5.1 In testing integrated electrical, control, and/or instrumentation systems where the plant design calls for interconnection between the existing and new systems, care shall be especially exercised to prevent tripping or otherwise dislocating the operation of equipment and/or systems associated with the existing unit(s).	10.5 Testing In testing integrated electrical control or instrumentation systems, or both, where the plant design calls for interconnection between the existing and new systems, care shall be exercised to prevent tripping or otherwise disturbing the operation of equipment or systems associated with the existing unit(s).	OK
Appendix B Additional Codes, Standards and Guides		No corresponding requirement in NQA-1. Specific provisions of codes, standards and guides not included in Subpart 2.4 which are applicable to project activities will be defined in associated procedures.
1. ANSI C1-1968,' National Electrical Code (NFPA 70-1968) (to be used as a guide when appropriate) 2. ANSI C29.1-1961, Test Methods for Electrical Power Insulators 3. ANSI Appendix C57.93, Guide for Installation and Maintenance of Oil-Immersed Transformers 4. ANSI Appendix C57.94, Guide for Installation and Maintenance of Dry-Type Transformers 5. ANSI C96.1-1969, Temperature Measurement Thermocouples 6. API RP550-1965,2 Manual on Installation of Refinery Instruments and Control Systems, Part I — Process Instrumentation and Control 7. API RP550-1965, Manual on Installation of Refinery Instruments and Control Systems, Part		No corresponding requirement in NQA-1. Specific provisions of codes, standards and guides not included in Subpart 2.4 which are applicable to project activities will be defined in associated procedures.

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording.
II — Process Stream Analyzers 8. ASME Boiler and Pressure Vessel Code, Section III, Nuclear Power Plant Components, 1971 9. IEEE Std 4-1968, Techniques for Dielectric Tests (ANSI C68.1-1968) 10. IEEE Std 43-1961, Recommended Practice for Testing Insulation Resistance of Rotating Machinery 11. IEEE Std 51-1955, Guiding Principles for Dielectric Tests		
12. IEEE Std 56-1958, Guide for Insulation Maintenance for Large AC Rotating Machinery 13. IEEE Std 62-1958, Guide for Making Dielectric Measurements in the Field 14. IEEE Std 64-1969, Guide for Acceptance and Maintenance of Insulating Oil in Equipment 15. IEEE Std 81-1962, Guide for Measuring Ground Resistance and Potential Gradients in the Earth 16. IEEE Std 95-1962. Guide for Insulation Testing of Large AC Rotating Machinery with High Direct Voltage 17. IEEE Std 112A-1964, Test Procedure for Polyphase Induction Motors and Generators 18. IEEE Std 114-1969, Test Procedure for Single-Phase Induction Motors 19. IEEE Std 115-1965. Test Procedure for Synchronous Machines 20. IEEE Std 118-1949, Master Test Code for Resistance Measurement 21. IEEE Std 120-1955 (withdrawn), Master Test Code for Electrical Measurement in Power Circuits 22. IEEE Std 262-1968, Test Code for Distribution, Power and Regulating Transformers, and Shunt Reactors (ANSI C57.12.90-1968)		No corresponding requirement in NQA-1. Specific provisions of codes, standards and guides not included in Subpart 2.4 which are applicable to project activities will be defined in associated procedures.

Enclosure 4, Table 4
ANSI N45.2.4-1972 vs NQA-1-1994, Subpart 2.4

ANSI N45.2.4 - 1972 (IEEE 336-1971)	NQA-1 (1994) Subpart 2.4 (except as noted)	Comments (NOTE: OK signifies identical or nearly identical wording
23. IEEE Std 283-1968, Guide for Installation of Oil-Immersed Transformers 24. ISA-RP3.1,4 Flowmeter Installations, Seal and Condensate Chambers, 1960 25. ISA-S5.1, Instrumentation Symbols and Identification, 1968 26. ISA-RP7.1, Pneumatic Control Circuit Pressure Test, 1956 27. ISA-RP7.2, Color Code for Panel Tubing, 1957 28. ISA-RP8.1, Instrument Enclosures for Industrial Environments 29. ISA-RP25.1, Materials for Instruments in Radiation Service, 1957 30. ISA-526, Dynamic Response Testing of Process Control Instrumentation, 1968 31. ISA-537.I, Electrical Transducers Nomenclature and Terminology, 1969 32. ISA-RP42.1, Nomenclature for Instrument Tubing Fittings (Threaded), 1965 33. NEMA ICS-1970,5 Industrial Controls and Systems 34. NEMA IS1.1-1969, Enclosures for Industrial Controls and Systems 35. NEMA SG 3-1965, Low-Voltage Power Circuit Breakers 36. NEMA SG 5-197 1, Power Switchgear Assemblies 37. NEMA VE 1-1965, Ventilated Cable Trays		No corresponding requirement in NQA-1. Specific provisions of codes, standards and guides not included in Subpart 2.4 which are applicable to project activities will be defined in associated procedures.

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
1.1 SCOPE This standard sets forth the supplementary quality assurance requirements for installation, inspection, and testing of nuclear safety related structural concrete, structural steel, soils, and foundations for nuclear power plant construction.	1 GENERAL Subpart 2.5 provides amplified requirements for installation, inspection, and testing of structural concrete, structural steel, soils, and foundations,	Similar Same Intent
It applies to the following: 1. Formwork 2. Steel Reinforcement 3. Embedded Items 4. Foundation Preparation 5. Concrete 6. Structural Steel 7. Soils and Earthwork 8. Special Foundations	and applies to the following: (a) formwork (b) steel reinforcement (c) embedded items (d) foundation preparation (e) concrete (f) structural steel (g) soils and earthwork (h) special foundations (i) foundation underpinning	OK
The requirements may also be extended to other appropriate parts of nuclear rower plants when specified in contract documents.	It supplements the requirements of Part I and shall be used in conjunction with applicable Basic and Supplementary Sections of Part I when and to the extent specified by the organization invoking Subpart 2.5.	Similar Same Intent
This standard is intended to be used in conjunction with ANSI N45.2.	It supplements the requirements of Part I and shall be used in conjunction with applicable Basic and Supplementary Sections of Part I when and to the extent specified by the organization invoking Subpart 2.5.	Similar Same Intent
1.2 APPLICABILITY The requirements of this standard apply to the work of any organization or individual participating in the production, preparation, placement, inspection, and testing of structural concrete, structural steel, soils and foundations, as identified in Section 1.1.	2 GENERAL REQUIREMENTS The requirements of Subpart 2.5 apply to any organization or individual participating in work relating to production, preparation, placement, installation, inspection, and testing of structural concrete, structural steel, soils, and foundations, and applies to the following:	Similar Same Intent
The extent to which the individual requirements of this Standard apply will depend upon the nature and scope of the work to be performed and the importance of the item or service involved.	NQA-1 Part II Introduction includes similar language with the same intent: An appropriate Quality Assurance Program, based on the nature and scope of the work to be performed and the relative importance of the items or services, shall be specified in contractual documents by selective applications of portions of Part I, Basic and Supplemental Requirements, for programmatic activities and of this Part (Part II) for work oriented activities.	Similar Same Intent

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
The requirements are intended to assure that only specified materials and workmanship are incorporated into the plant; that quality of materials and quality of workmanship are maintained throughout the construction process; that the work is performed in accordance with applicable construction procedures; and that the completed installation conforms to the specified requirements.	NQA-1 Part II Introduction includes similar language with the same intent: This Part (Part II) sets forth the quality assurance requirements for the planning and execution of identified tasks during the fabrication, construction, modification, repair, maintenance, and testing of systems, components, and structures for nuclear facilities.	Similar Same Intent
The ASME Boiler and Pressure Vessel Code, Section III, Divisions 1 and 2, as well as other American National Standards, have been considered in the development of this standard; and this standard is intended to be compatible with their requirements.		Guidance only. Wording does not establish requirements
This standard applies to structural concrete, structural steel, and foundation components of nuclear power plants not covered by the Code.	Subpart 2.5 provides amplified requirements for installation, inspection, and testing of structural concrete, structural steel, soils, and foundations.	Similar Same Intent
However, this Standard does not apply to activities covered by Section III, Divisions 1 and 2 and Section XI of the Code for those activities covered by the Code,		Guidance only. Wording does not establish requirements
1.3 RESPONSIBILITY The organization or organizations responsible for establishing the applicable requirements for the activities covered by this standard shall be identified, and the scope of their responsibilities shall be documented.	NQA-1 Basic Requirement 1 includes similar words: The organizational structure, functional responsibilities, levels of authority, and lines of communication for activities affecting quality shall be documented. Supplement 1 S-1 3.1 Responsibility Where more than one organization is involved in the execution of activities covered by this Part (Part II), the responsibility and authority of each organization shall be clearly established and documented.	Similar Same Intent
The work of establishing practices and procedures and providing the resources in terms of personnel, equipment, and services necessary to implement the requirements of this Standard may be delegated to other organizations, and such delegation also shall be documented.	NQA-1 Supplement 1S-1 2.2 Delegation of Work includes similar words: The individuals(s) or organizations(s) responsible for establishing and executing a quality assurance program under this Standard may delegate any or all of the work to others but shall retain responsibility therefor.	Similar Same Intent
It is the responsibility of each organization performing work covered by this standard to comply with the procedures and instructions issued for the project and to conform to the requirements of this standard applicable to their work.	The organization upon which this Part (Part II), or portions thereof, is invoked shall be responsible for complying with the specified requirements.	Similar Same Intent
It is the responsibility of the organization performing these activities to specify the detailed methods and procedures unless they are specified in the procurement documents.	Part II Introduction 2 Applicability Planning shall define the operations to be performed, the systematic sequential progression of operations, and the overall measures to be employed to preserve the quality of the work.	Similar Same Intent

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
1.4 DEFINITIONS The following definitions are provided to assure a uniform understanding of select terms as they are used in this standard.	1.1 Definitions The following definitions are provided to assure a uniform understanding of unique terms as they are used in Subpart 2.5.	OK
Additional definitions of terms are included in ANSI N45.2.10.	NQA-1 Part II Introduction includes similar language with the same intent: 6 DEFINITIONS Definitions unique to the activities described in this Part (Part II) are included in the section dealing with that activity. Definitions generic to quality assurance activities are included in Part I, Supplement S-1, Terms and Definitions.	Similar Same Intent
Class of Concrete — Identifies each individual design mix.	class of concrete — identifies each individual design mix	OK
Correlation Testing - A form of in-process testing accomplished consistent with established procedures and which provides for the comparison on results of specified tests of concrete samples taken of corresponding batches from two different points to establish to what extent the conditions and method of transit has impacted on specified requirements for plastic concrete at the placement point.	correlation testing — a form of in-process testing accomplished consistent with established procedures, which provides for the comparison of results of specified tests of concrete samples taken of corresponding batches from two different points to establish to what extent the conditions and method of transit have impacted on specified requirements for plastic concrete at the placement point	OK
Curing — The process of maintaining a satisfactory moisture content and a favorable temperature in concrete during hydration of the cementitious materials so that desired properties of the concrete are developed.	curing — the process of maintaining a satisfactory moisture content and a favorable temperature in concrete during hydration of the cementitious materials so that desired properties of the concrete are developed	OK
Delivery Point - The point of discharge in the case of a truck agitator unit, or non-agitating unit when another conveying device is to be used to transport the plastic concrete to the placement point. Where a truck agitator unit is used in the transit of concrete, the delivery point and the mixing point are considered coincident when: (1) the delivery point is not more than a distance of two miles and an average of one half-hour in transit from the mixing point, and (2) the delivered concrete commences to be placed within an average of one-half hour from the time the transporting vehicle arrives at the delivery point.	delivery point — the point of discharge in the case of a truck agitator unit, or non-agitating unit when another conveying device is to be used to transport the plastic concrete to the placement point. Where a truck agitator unit is used in the transit of concrete, the delivery point and the mixing point are considered coincident when: (a) the delivery point in not more than a distance of 2 mi (3.22 kin) and a maximum time of 1/2 hr in transit from the mixing point, and (b) the delivered concrete commences to be placed within a maximum time of 1/2 hr from the time the transporting vehicle arrives at the delivery point. When a non-agitating unit is used, the delivery point and the mixing point shall not be considered coincident.	Similar Same Intent Statement "When a non-agitating unit is used, the delivery point and the mixing point shall not be considered coincident." was added in NQA-1.
Finishing — The process of obtaining specified surface characteristics of hardened concrete.	finishing — the process of obtaining specified surface characteristics of hardened concrete	OK

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
Mixing Point - The point of discharge of plastic concrete from a central mix plant. For truck mixed concrete the mixing point and delivery point are defined as coincident.	mixing point — the point of discharge of plastic concrete from a central mix plant. For truck mixed concrete, the mixing point and delivery point are defined as coincident.	OK
Placement Point-The point of discharge of plastic concrete into the forms. Except for pumped concrete the placement point and the delivery point are considered coincident when 5 minutes or less is used in transit of the concrete from the delivery point to the placement point.	placement point — the point of discharge of plastic concrete into the forms. Except for pumped concrete, the placement point and the delivery point are considered coincident when 5 min or less is used in transit of the concrete from the delivery point to the placement point.	OK
Qualified Procedures — Procedures which incorporate applicable codes and standards, manufacturer's parameters, and engineering specifications.	ASME NQA-1 Section I Introduction Subsection 4 Terms and Definitions: Qualified procedure – an approved procedure that has been demonstrated to meet the specified requirements for its intended purpose.	OK
Qualification Tests — Tests performed to qualify the basic material source or manufacturer. These tests are mandatory unless current documentary test data is available to establish complete confidence in conformance to specification requirements.	qualification tests — tests performed to qualify the basic material source or manufacturer to assure conformance to specification requirements also 4.2 To assure that materials meet specified requirements, preconstruction qualification tests and inspections of the materials to be used and in-process tests of materials being used shall be conducted. Qualification tests shall be performed and the results evaluated prior to the initial use of the material to establish conformance of the materials to the specified requirements. These tests are mandatory unless current documentary test data are available to establish complete confidence in conformance to specification requirements.	OK
In-Process Tests - Tests performed during the course of construction to determine compliance with specified requirements and to maintain control of structural materials. These tests may be performed by the purchaser (or his agent), contractor, manufacturer or supplier, but samples for these tests must be taken from the lot or batch of materials supplied and used at the site of construction.	in-process tests — tests performed during the course of construction to determine compliance with specified requirements and maintain control of materials. These tests may be performed by the purchaser (or his agent), constructor, manufacturer, or supplier, but samples for these tests must be taken from the lot or batch of materials supplied and used at the site of construction.	OK
2. GENERAL REQUIREMENTS 2.1 PLANNING Measures shall be established and implemented for documenting installation, inspection, and testing operations to verify conformance to specified requirements.	3 REQUIREMENTS Measures shall be established and implemented for documenting installation, inspection, and testing activities to verify conformance to specified requirements.	OK

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
Planning shall take into account the need for the preparation and control of procedures and work instructions necessary to comply with requirements for installation, inspection, and testing.	3.1 Planning and Procedures Planning and procedure preparation shall be in accordance with the Introduction to this Part (Part II) NQA-1 Part II Introduction includes similar language with the same intent: "A plan shall be developed outlining the work to be performed and the work procedures or instructions required to comply with the requirements of the defined work scope."	Similar Same Intent
Planning shall include a review of the structure, system, or component design and procurement specifications, materials lists, drawings, construction work plans, procedures, and schedules to assure that installation, inspection, and testing activities have been incorporated; that they can be accomplished as specified; and that time and resources are sufficient to accomplish the scheduled construction without degradation of quality.	NQA-1 Part II Introduction includes similar language with the same intent: "Planning shall include a review of the structure, sys-tem or component design/procurement specifications, materials, lists, drawings, construction work plans, and schedules to ensure that fabrication, installation, modification, inspection, testing, etc., activities have been incorporated; that the work can be accomplished as specified; and that time and resources, plus training, are sufficient to accomplish the work in accordance with the specified requirements.	Similar Same Intent
2.2 Procedures and Instructions Installation, inspection and test procedures, and work instructions shall be prepared and documented for those activities falling within thc scope of this Standard.	NQA-1 Part II Introduction includes similar language with the same intent: Installation, inspection, test procedures, and work instructions identified during planning shall be pre-pared.	Similar Same Intent
These documents shall be revised and controlled as necessary to assure that installation, inspections, and tests are performed in accordance with latest information and shall include as appropriate:	NQA-1 Part II Introduction includes similar language with the same intent: The documents shall be kept current and revised as necessary to assure that the work is per-formed in accordance with the latest approved information. The documents shall include the following as applicable:	Similar Same Intent

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
1. Installation specifications. 2. Inspection and test objectives and requirements. 3. Precautions to avoid component or system damage during installation, inspection, and following inspection but prior to use. 4. Inspection and test equipment required. 5. Sequence of tests (if applicable). 6. Sequential actions to be followed. 7. Frequency of inspections and tests. 8. Prerequisites. 9. Approvals. 10. Data report form. 11. Identification of test equipment and date of required recalibration where required for interpretation of test results. 12. Inspection and test acceptance limits.	NQA-1 Part II Introduction includes similar language with the same intent: (a) personnel safety and structure or facility protection considerations (b) precautions to be observed (c) work requirements including installation specifications (d) sequence of activities to be followed and steps within a given activity (e) prerequisites including preparatory checks and inspections (f) test and inspection objectives (g) special equipment required (h) identification of inspection and test equipment and related calibration requirements including recalibration dates (i) sequence and frequency of inspection or test (i) acceptance criteria and methods for verifying (k) responsibility and required qualifications of personnel (l) approvals and authorizing or verifying signatures (in) specific document references (n) data or test report forms (o) information to be collected for plant records (p) processing inspection and test data and their analysis, evaluation, and final acceptance	Similar Same Intent
2.3 RESULTS Inspection and test results shall be documented in a suitable test report or data sheet.	9.1 ... Inspection and test results that include inspection and test data, together with a report of data analysis and evaluation, shall be provided as specified in Section 10. Also 10S-1 2 INSPECTION REQUIREMENTS ... Inspection activities shall be documented and controlled ...	Similar Same Intent
Each report shall identify the item to which it applies, the procedures or instructions followed in performing the task, and the following:	Supplement 10 S-1: 9 Records Records shall as a minimum, identify (a) through (f) below:	Similar Same Intent
1. Pertinent inspection and test data such as identification of location where testing was performed or where test samples were taken. 2. Significant dates and times. 3. Inspection acceptance and test completion signatures. 4. Conditions encountered which were not anticipated1 including nonconformance.	(a) item inspected (b) date of inspection (c) inspector (d) type of observation (e) results or acceptability (f) reference to information on action taken in connection with nonconformances	Similar Same Intent
Test reports and data sheet shall include an evaluation of the acceptability of inspection and test results and provide for identifying the individual who performed the evaluation.	Supplement 11 S-1: 5 Test Records (d) type of observation (e) results and acceptability (f) action taken in connection with any deviations noted (g) person evaluating test results	Similar Same Intent

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5 - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
2.4 PERSONNEL QUALIFICATIONS Personnel performing tests and inspections required by this standard shall be qualified in accordance with ANSI N45.2.6.	NQA-1 Part II Introduction includes similar language with the same intent: 5 QUALIFICATION OF PERSONNEL Inspection, test, and nondestructive examination personnel and laboratory technicians shall be trained and qualified/certified in accordance with the applicable portions of Part I, Basic and Supplementary Requirements. Professional personnel shall meet the requirements defined by the implementing organization in its position descriptions.	Similar Same Intent
2.5 MEASURING AND TEST EQUIPMENT 2.5.1 Selection. Measuring and test equipment used to implement the requirements of this standard shall be selected on the basis of accuracy sufficient to determine conformance to specified requirements. These measuring devices shall include but not be limited to thermometers, balances, scales, air entrainment meters, humidity meters, volumetric buckets, field moisture testing and soil density measuring devices, pressure gages, and torque wrenches.	3.2 Measuring and Test Equipment Measuring and test equipment used to implement the requirements of Subpart 2.5 shall include (but not be limited to) thermometers, balances, scales, air entrainment meters, volumetric buckets, field measuring devices, pressure gages, and torque wrenches. Also Supplement 12 S-1, 2 Selection: Selection of measuring and test equipment shall be controlled to assure that such items are of proper type, range, accuracy, and tolerance to accomplish the function of determining conformance to specified requirements.	Similar Same Intent
2.5.2 Calibration and Control. The equipment shall be adjusted or calibrated or both at prescribed intervals against certified standards having known valid relationships to national standards where such exist.	Supplement 12 S-1, 3.1 Calibration: Measuring and test equipment shall be calibrated, adjusted, and maintained at prescribed intervals or, prior to use, against certified equipment having known valid relationships to nationally recognized standards.	Similar Same Intent
If no national standards exist, the basis for the adjustment or calibration shall be documented.	Supplement 12 S-1, 3.1 Calibration: If no nationally recognized standards exist, the bases for calibration shall be documented.	OK
Records shall be maintained and equipment suitably marked to indicate calibration status.	Supplement 12 S-1, 5 Records: Records shall be maintained and equipment shall be suitably marked to indicate calibration status.	OK
Measures shall be taken to assure proper handling, storage and care of installation of inspection and testing equipment after adjustment of calibration in order to maintain the required accuracy of such equipment.	Supplement 12 S-1, 4 Handling and Storage: Measuring and test equipment shall be properly handled and stored to maintain accuracy.	Similar Same Intent
Test equipment found to be out of calibration shall be clearly identified as such.	Supplement 12 S-1, 3.2 Control: Out-of-calibration devices shall be tagged or segregated and not used until they have been recalibrated.	Similar Same Intent

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5 - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
When discrepancies, malfunctions or inaccuracies in inspection and testing equipment are found during calibration, all items inspected with that equipment since the last previous calibration shall be considered unacceptable until an evaluation has been made by the responsible authority and appropriate action taken.	Supplement 12 S-1, 3.2 Control: When measuring and test equipment is found to be out of calibration, an evaluation shall be made and documented of the validity of previous inspection or test results and of the acceptability of items previously inspected or tested.	Similar Same Intent
2.6 Laboratory Testing. Laboratory operations and testing associated with concrete and soils shall be controlled using a Quality Assurance program.	3.3 Laboratory Testing Laboratory operations and testing associated with concrete and soils shall be controlled using a Quality Assurance Program.	OK
2.7 HOUSEKEEPING In areas, facilities and environments where installation, inspection and testing activities are performed in accordance with the requirements of this standard, the housekeeping requirements shall be in accordance with ANSI N45.2.3.	N45.2.3 incorporated into NQA-1 as Subpart 2.3.	Specific provisions of Subpart 2.3 which are applicable to project activities will be defined in associated procedures.
3 PRECONSTRUCTION VERIFICATION 3.1 GENERAL Receipt inspections and storage are covered by another standard, ANSI N45.2.2. Interim inspections shall be used to verify that items are in satisfactory condition for installation.	4 PRECONSTRUCTION VERIFICATION 4.1 General Receipt and interim storage inspections shall be used to verify that items are in a satisfactory condition for installation.	Similar *Same Intent*
The verification shall include:	The verification shall include the following:	OK
(1) Visual examination of materials for proper identification, physical damage, and contamination. (2) Review of manufacturer's documentation, test reports, or other evidence of quality conformance for correctness and compliance with specifications if not reviewed at time of receipt.	(a) visual inspection of material for proper identification, physical damage, and contamination; (b) review of manufacturer's documentation, test reports, or other evidence of quality conformance for correctness and compliance with specifications if not reviewed at time of receipt.	OK
3.2 MATERIALS SUITABILITY To assure that materials meet specified requirements, preconstruction qualification tests and inspections of the materials to be used and in-process tests of the materials being used shall be conducted.	4.2 Materials Suitability To assure that materials meet specified requirements, preconstruction qualification tests and inspections of the materials to be used and in-process tests of materials being used shall be conducted.	OK

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
3.2.1 Qualification Tests. Qualification tests shall be performed and the results evaluated prior to the initial use of the materials to establish conformance of the materials to the specified requirements.	Qualification tests shall be performed and the results evaluated prior to the initial use of the material to establish conformance of the materials to the specified requirements.	OK
	The specifications shall identify the required qualification tests and the frequency for their repetition.	These words were added in NQA-1
	The tests required for concrete, concrete constituents, materials for reinforcing systems, materials for prestressing systems and welding materials shall be in accordance with the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	These words were added in NQA-1
	Lightweight concrete mix designs shall be made in accordance with ACI 211.2.	These words were added in NQA-1
	Lightweight concrete aggregates shall be qualified by tests for conformance with ASTM C 330.	These words were added in NQA-1
	When splitting tensile strengths are required for lightweight concrete mix, the methods given in ASTM C 330 shall be used.	These words were added in NQA-1
A list of normally required qualification tests or certifications is contained in Table A. (Table A lists various test standards)	Qualification and certification testing is addressed in 4.2 as noted above as well as in 5.2	Test Standards are now included in the body of subpart 2.5 at the appropriate location. This area is similar with the same intent. Specific provisions of Subpart 2.5 which are applicable to project activities will be defined in associated procedures.
This list contains tests to qualify materials for normal application.		Since Test Standards are now included in the body of subpart 2.5 at the appropriate location, this guidance is no longer applicable. Specific provisions of Subpart 2.5 which are applicable to project activities will be defined in associated procedures.
Additional tests may be required to qualify materials for special applications.	Additional tests may be required to qualify materials for special application.	OK
3.3 CONSTRUCTION PROCESSES Inspections shall be performed to verify that the prerequisites for control of construction processes such as welding, bolting, structural reinforcement, splicing, and concrete measuring, mixing, transporting, placing, and curing have been accomplished.	4.3 Construction Processes Inspections shall be performed to verify that the prerequisites for control of construction processes such as welding, structural bolting, mechanical splicing of reinforcement, and concrete measuring, mixing, transporting, placing, and curing have been accomplished.	OK

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
These inspections shall include: 1. Verification that the process has been qualified as required. 2. Verification that process controls are in effect. 3. Verification that qualified procedures, instruction manuals, or both, if required for specific equipment, are available for use during construction. 4. Verification that the process is suitable for the particular application. 5. Verification that manpower, equipment, and materials are readily available and adequate to perform the work in accordance with drawing and specification requirements.	These inspections shall include verification of the following: (a) the process has been qualified as required; (b) process controls are in effect; (c) approved procedures, instruction manuals, or both, if required for specific equipment, are available for use during construction; (d) the process is suitable for the particular application; (e) manpower, equipment (including measuring and testing equipment), and materials are readily available and adequate to perform the work inaccordance with drawing and specification requirements.	Similar Same Intent The words in item (e) " (including measuring and testing equipment)" were added in NQA-1
4 INSPECTION OF SOILS AND EARTHWORK 4.1 GENERAL Inspection of soils and earthwork shall include preparations for earthwork as well as in-process inspections of placing and compacting operations to assure conformance to specified requirements.	5 INSPECTION OF SOILS AND EARTHWORK 5.1 General Inspection of soils and earthwork shall include preparations for earthwork, as well as in-process inspections of placing and compacting operation, to assure conformance to specified requirements.	OK
4.2 MATERIALS Inspections of stockpiles or borrow pits shall be performed to verify conformance to specified requirements.	5.2 Materials Inspections and qualification testing of stockpiles or borrow pits shall be performed to verify conformance to specified requirements.	OK
	Qualification tests of soil fill materials shall be performed for: (a) grain size analysis using ASTM D 422; (b) moisture-density relationship of soil using ASTM D 1557, and D 698; (c) maximum and minimum index density of soils using ASTM D 4253 and D 4254; (d) liquid limit, plastic limit, and plasticity index of soils using ASTM D 4318; and (e) unified soil classification using ASTM D 653, D 2487, and D 2488.	These words were added in NQA-1
	Other qualification tests of soil fill materials may be used when specified.	These words were added in NQA-1
4.3 PLACING AND COMPACTING EQUIPMENT Inspections shall be performed prior to compacting operations to verify the adequacy of compacting equipment.	5.3 Placing and Compacting Equipment Inspections shall be performed prior to compacting operations to verify the adequacy of compacting equipment.	OK
These inspections shall include the following:	These inspections shall include the following:	OK

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
1. Inspections to verify that compacting equipment has the specified weight, if applicable. 2. Inspections to verify that the specified type of equipment is available and in operating condition. 3. Inspections of vibratory compaction equipment to verify correct vibration frequency.	(a) inspections to verify that compacting equipment has specified weight, if applicable; (b) inspections to verify that the specified type of equipment is available and in operating condition; (c) inspections of vibratory compaction equipment to verify correct vibration frequency.	OK
4.4 PREPLACEMENT PREPARATIONS Inspections of preparations for fill placement *shall include the following:*	5.4 Preplacement Preparations Inspections of preparations for fill placement *shall include the following:*	OK
I. Inspections to assure compliance with site preparation requirements. 2. Inspections to assure that the subgrade surface is level within specified limits. 3. Inspections to assure that the subgrade surface is free of deleterious materials and voids and in compliance with specified requirements. 4. Inspections to assure that the subgrade surface is free of excess moisture, snow, frost or frozen lumps. 5. Inspections to verify that subgrade compaction *meets specified requirements.* 6. Documentation of the inspections required by items (1) through (5) shall be verified as being complete and indicating that all inspection results are satisfactory.	(a) inspections to assure compliance with site preparation requirements; (b) inspections to assure that the subgrade surface is within specified limits; (c) inspections to assure that the subgrade is free of deleterious materials and voids and in compliance with specified requirements; (d) inspections to assure that the subgrade is free of excess moisture, snow, frost, or frozen lumps; (e) inspections to verify that subgrade *preparation meets specified requirements;* (f) documentation of the inspections required by (a) through (e) above shall be verified as being complete and indicating that all inspection results are satisfactory	OK
4. SOIL COMPACTION Inspections of soil compaction during construction shall be performed to verify the following:	5.5 Soils Compaction Inspections of soil compaction during construction shall be performed to verify the following:	OK
1. That fill material meets specified requirements. 2. That segregation of the fill material does not occur as it is dumped and spread. 3. That specified lift thicknesses are not exceeded. 4. That when specified a "knitting technique" is used when joining lifts. 5. That the compacting equipment makes the specified number of passes over each lift and that passes overlap.	(a) fill material meets specified requirements; (b) segregation of the fill material does not occur as it is dumped and spread; (c) specified lift thicknesses are not exceeded; (d) when specified, a knitting technique is used when joining lifts and where fill is placed against existing earth slopes or adjacent to previously compacted fills; (e) the compacting equipment makes the specified number of passes over each lift and that passes over-lap; (f) heavy compaction equipment does not impose overloads of subsurface structures or foundations, unless otherwise stated in the specifications, that are based on design considerations; (g) heavy compact equipment does not overload buried structures before backfill is placed to grade.	Similar Same Intent Words in (d) "and where fill is placed against existing earth slopes or adjacent to previously compacted fills;", (f) "heavy compaction equipment does not impose overloads of subsurface structures or foundations, unless otherwise stated in the specifications, that are based on design considerations;" and (g) "heavy compact equipment does not overload buried structures before backfill is placed to grade." added in NQA-1

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
4.6 In-process test on compacted fill In-process tests shall be performed during the course of construction to maintain control of soil compaction.	5.6 In-Process Tests on Compacted Fill In-process tests shall be performed during the course of construction to maintain control of soil compaction.	OK
A list of the required in-process tests is contained in Table B.	A list of the in-process tests for soils is shown in Table 5.6. .	OK
Table B	Table 5.6	The tests for soils listed in Table 5.6 is the same as those listed in N45.2.5 Table B with one exception, for Moisture Density relationships (compaction tests per 45.2.5) the frequency is increased in Subpart 2.5 through the increase in field density testing. This is more conservative and results in similar requirements with same intent. Specific provisions of Subpart 2.5 which are applicable to project activities will be defined in associated procedures.
In-process tests shall be performed more frequently if the test results are erratic or if the trend of results or an apparent change in material characteristics indicates that the frequency should be increased.	The need for each specific test shall be established in the specifications. In-process tests shall be performed more frequently if the test results are erratic, or if the trend of results or an apparent change in material characteristics indicates that the frequency should be increased.	Similar Same Intent OK
5 INSPECTION OF FOUNDATION FILES AND CAISSONS CONSTRUCTION 5.1 Pile 5.1.1 Pile Receiving Handling and Storage. Inspections shall be performed to verify that specified material has been received and to verify the adequacy and proper maintenance of pile storage and handling techniques.	6 INSPECTION OF FOUNDATION PILE AND CAISSON CONSTRUCTION 6.1 Piles 6.1.1 Pile Receiving, Handling, and Storage. Inspections shall be performed to verify that the specified material has been received and to verify the adequacy and proper maintenance of pile storage and handling techniques.	OK
These inspections shall include the following: 1. Receiving inspection 2. Inspection of handling procedure to verify that proper lifting points and lifting techniques are utilized. 3. Inspection of storage procedure to verify that suitable storage areas have been designated, blocking is adequate and properly located, and that piles can be rehandled without damage. 4. Inspection of procedure for transporting piles from storage area to driving location to verify that proper support and lifting points are utilized, that proper lifting technique is used to position the pile for driving, and that pile to be driven is undamaged and as specified.	These inspections shall include the following: (a) receiving inspection; (b) inspection of handling procedure to verify that proper lifting points and lifting techniques are utilized; (c) inspection of storage procedure to verify that suitable storage areas have been designated, that blocking is adequately and properly located, and that piles can be rehandled without damage; (d) inspection of procedure for transporting piles from storage area to driving location to verify that proper support and lifting points are utilized, that proper lifting technique is used to position the pile for driving, and that pile to be driven is undamaged and as specified.	OK

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5 - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
5.1.2 Pile Driving and Cast in Place Pile Construction. Pile driving and cast in place pile construction shall be inspected to verify that piles are properly located from site base lines and elevation benches, located according to length and capacity, and that pile driving surface has been properly prepared, excavated to the designated driving elevation, and drained or dewatered and that pile driving equipment in compliance with the specification is available.	6.1.2 Pile Driving and Cast-in-Place Pile Construction. Pile driving and cast-in-place pile construction shall be inspected to verify that the specified piles are properly located from site baselines and elevation benches (located according to length and capacity), that the surface from which the piles will be driven has been properly prepared, excavated to the designated driving elevation, and drained or dewatered, as specified, and that pile driving equipment in compliance with the specification is available.	OK
5.1.2.1 Wood, Steel and Precast Concrete Piles, and Cast In P1ace Concrete Piles with Permanent Casing. The driving of wood, steel and precast concrete piles, and the shells for cast in place concrete piles shall be inspected to verify the following:	6.1.2.1 Installation of Wood, Steel, and Precast Concrete Piles, and Cast-in-Place Concrete Piles With Permanent Casing and Shell. The installation of wood, steel, and precast concrete piles, and the shells or casing for cast-in-place concrete piles shall be inspected to verify the following:	Similar Same Intent The words "or casing" added to NQA-1 OK
1. The specified pile hammer is being used and is operating at the required speed. 2. The pile being driven is the specified type, capacity and length. 3. The pile is driven plumb or to the specified batter, to the specified tip elevation and that the blow count at that elevation is as specified 4. The proper type of cushioning material is used between the hammer and the pile. 5. The follower used on piles with the final top elevation below the existing grade is compatible with the driving characteristics of the pile. 6. The piles adjacent to the pile being driven are checked for heave and redriven if required. 7. The sequence of pile driving is as specified in order to avoid displacement of piles in place.	a) the specified pile hammer is being used and is operating at the required speed; (b) the pile being installed is the specified type and length; (c) the pile is installed within specified tolerances of locations, plumb, and rotation or to the specified batter, to the specified tip elevation, and that the blow counts are as specified; (d) the proper type of cushioning materials is used between the hammer and the pile and to assure that piles are not being damaged during driving; e) the follower used on piles with the final top elevation below the existing grade is compatible with the driving characteristics of the pile; (f) the piles that are adjacent to the pile being installed are checked for heave and reinstalled if required; (g) the sequence of pile installation is as specified in order to avoid displacement of piles in place; (h) adjacent structures, fresh concrete, etc., are not damaged due to driving vibrations; (i) drilling and jeting are only done when specified and are performed in accordance with the specification; (j) complete records are made of pile driving resistance	Similar Same Intent Items H, I, and J were added in NQA-1
5.1.2.2 Concrete Placement in Cast in Place Piles with Permanent Casing. Prior to concreting cast in place concrete piles, inspection shall be performed to verify the following:	6.1.2.2 Concrete Placement in Cast-in-Place Piles With Permanent Casing. Prior to concreting cast-in-place concrete piles, inspection shall be performed to verify the following:	OK

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
(1) The casing has not buckled or ruptured. (2) The casing is straight. (3) The casing is dewatered if necessary. (4) The reinforcement is installed and positioned as specified and is secured against displacement during concreting.	a) the casing has not buckled or ruptured; b) the casing is straight; c) the casing is dewatered, if necessary, and inside of casing has been cleaned to the tip elevation; d) the reinforcement is installed and positioned as specified and is secured against displacement during concreting; e) the volume of concrete used is consistent with the estimated required volume; f) grouting pressure or compaction energy used to form the pile is as specified.	Similar Same Intent Items E and F were added in NQA-1
The placement of concrete in the pile casing shall be inspected to verify that it conforms with subsection 6.5, Concrete Placement.	The placement of concrete in the pile casing shall be inspected to verify that it conforms with paras. 7.5 and 7.7, as applicable.	OK
5.1.2.3 Cast in Place Piles Without Permanent Casing. The construction of cast in place piles without permanent casing shall he inspected to verify the following:	6.1.2.3 Concrete Placement for Cast-in-Place Piles Without Permanent Casing. The construction of cast-in-place piles without permanent casing shall be inspected to verify the following:	OK
(1) The size and tip elevation of the pile is as specified. (2) The completed pile is plumb or to the specified batter. (3) The quantity of concrete placed in the pile is consistent with the size and length specified. (4) The method for withdrawing the casing will not cause separation of the pile concrete. (5) The method for withdrawing the casing during the placing of concrete maintains a level of concrete sufficiently above the bottom of the casing to avoid soil intruding or necking down the concrete pile. (6) The placement of concrete in the pile conforms with paragraph 6.5, Concrete Placement.	a) the volume of concrete used is consistent with the estimated required volume; b) the method for withdrawing the casing will not cause separation of the pile concrete; c) the method for withdrawing the casing during the placing of the concrete maintains a level of concrete sufficiently above the bottom of the casing to avoid soil intruding or necking down the concrete pile; d) the placement of concrete in the pile casing conforms with paras. 7.5 and 7.7; e) grouting pressure or compaction energy used to form the pile is specified.	Similar Same Intent Items (1) and (2) were omitted in NQA-1. Item (e) was added in NQA-1
5.1.2.4 Pile Splicing. The construction of composite piles and the splicing of piles with the same section above and below the splice shall be inspected to verify the following:	6.1.2.4 Pile Splicing. The construction of composite piles and the splicing of piles with the specified section above and below the splice shall be inspected to verify the following:	OK
(1) The top section is properly aligned with the bottom section. (2) The splice interface is clean and is properly prepared and spaced for application of the splicing material. (3) The pile is at the specified temperature limits for splicing and that the splice is installed in accordance with applicable standards and specifications.	a) the top section is properly aligned with the bottom section; b) the splice interface is clean and is properly prepared and spaced for application of the splicing material; c) the pile is at the specified temperature limits for splicing and that the splice is installed in accordance with applicable standards and specifications.	OK

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
5.1.2.5 Inspection of Concrete Construction. Concrete construction of cast in place piles and protective concrete cast around piles shall be inspected in accordance with Section 6, Inspection of Concrete Construction.	.1.2.5 Inspection of Concrete Construction. Concrete construction of cast-in-place piles and protective concrete cast around piles shall be inspected in accordance with Section 7.	OK
5.1.2.6 Test Piles. Test piles shall. be inspected to verify that:	6.1.2.6 Test Piles. Test piles shall be inspected to verify that:	OK
(1) Load tests are made on piles driven or cast. in place in the same manner as production piles. (2) The driving or construction is in accordance with the applicable paragraphs above. (3) The performance of load testing is in accordance wlth ASTM D1143, Load Settlement Relationship for Individual Vertical Piles Under Static Axial Load.	(a) load tests are made on piles driven or cast-in-place in the same manner as production piles; (b) the driving or construction is in accordance with the applicable paragraphs above; (c) the performance of load testing is in accordance with ASTM D 1143, Method of Testing Piles Under Static Axial Compressive Load.	OK
5.2 CAISSONS Caisson excavation shall be inspected to verify that:	6.2 Caissons 6.2.1 Caisson excavation shall be inspected to verify that:	OK
(1) Caissons are correctly located. (2) The caisson shaft is straight and plumb or to the specified batter, and suitable means are employed to maintain the shaft diameter. (3) The bottom of the caisson is at the specified elevation and is level or is excavated in steps as necessary to provide level and uniform bearing over the full base area. (4) There are no unacceptable voids, caverns or strata of compressable material below the bottom of caisson. (5) Underreamed caissons have the specified bottom diameter and side slope. (6) The rock socket of drilled in caissons is the specified diameter and depth. (7) The shear rings of friction caissons are the specified size and spacing.	a) caissons are correctly located; b) the caisson shaft is straight and plumb, or to the specified batter, and suitable means are employed to maintain the shaft diameter; c) the bottom of the caisson is at the specified elevation and is level, or is excavated in steps as necessary to provide level and uniform bearing over the full base area; d) there are no unacceptable voids, caverns, or strata of compressible material below the bottom of the caisson; e) underreamed caissons have the specified bottom diameter and side slope; f) the rock socket of drilled-in caissons is the specified diameter and depth; g) the shear rings of friction caissons are the specified size and spacing.	OK
5.2.2 Caisson concrete construction shall be inspected in accordance with subsection 6.4, Preplacement Preparations, subsection 6.5, Concrete Placement, and subsection 6.7, Curing, of Section 6.	6.2.2 Caisson concrete construction shall be inspected in accordance with Section 7.	OK
In addition caisson concreting shall be inspected to verify that:	In addition, caisson concrete shall be inspected that:	OK

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
(1) All loose spoil has been removed from the bottom of the caisson excavation prior to concreting. (2) The caisson excavation has been dewatered or that approved means of placing concrete underwater are employed. (3) Sufficient head of concrete is maintained above the bottom of the casing while it is being withdrawn to avoid soil intrusion or necking down of the concrete shaft. (4) Method of withdrawal of the casing prevents voids in or separation of the concrete shaft. (5) Approved methods of proportioning and placing concrete are employed in slurry stabilized caisson to prevent segregation or mixing with slurry and to assure specified concrete strength.	a) all loose soil has been removed from the bottom of the caisson excavation prior to concreting; b) the caisson excavation has been dewatered or that approved means of placing concrete underwater are employed; c) sufficient head of concrete is maintained above the bottom of the casing while it is being withdrawn to avoid soil intrusion or necking down of the concrete shaft; d) method of withdrawal of the casing prevents voids in or separation of the concrete shaft; e) approved methods of proportioning and placing concrete are employed in slurry stabilized caisson to prevent segregation or mixing with slurry and to assure specified concrete strength; f) the volume of concrete used is consistent with the estimated required volume.	Similar Same Intent Item (f) was added in NQA-1
5.3 REQUIRED QUALIFICATION TESTS The required qualification tests are covered in Table A.	6.3 Required Qualification Tests The required qualification tests are as follows: (a) Wood piles shall conform to specifications such as ASTM D 25, and AWPA C3, and ASTM D 1760 for wood preservation treatment. (b) Steel piles shall conform to specifications such as ASTM A 252 for pipe, and ASTM A 6 and A 36 for structural shapes. (c) Concrete piles (precast, cast in place and pre-stressed) shall conform to approved specifications used in the manufacturer's certification, or as specified.	The tests listed are the same as those listed in Table A of N45.2.5 with additional tests listed for wood piles regarding the wood preservative treatment. Therefore subpart 2.5 is more conservative than N45.2.5. Specific provisions of Subpart 2.5 which are applicable to project activities will be defined in associated procedures.
6 INSPECTION OF CONCRETE CONSTRUCTION 6 6.1 GENERAL inspection of concrete construction shall include inspections of preparations for concreting, as well as in-process inspections of concrete measuring, mixing, transporting, placement, curing, and protection to assure conformance to specified requirements.	7 INSPECTION OF CONCRETE CONSTRUCTION 7.1 General Inspection of concrete construction shall include inspection of preparations for concreting, as well as in-process inspections of concrete measuring, mixing, transporting, placement, curing, and protection to assure conformance to specified requirements.	OK
The inspection of pre- or post-tensioning systems shall be included, if applicable.	The inspection of pretensioning or post-tensioning systems shall be included, if applicable.	OK
The inspection shall follow the Recommended Practice for Concrete Inspection, ACI 311 and the PCI Manual for Quality Control.	The inspection shall follow ACI 311.4R, Guide for Concrete Inspection, and PCI MNL-116 and MNL-117.	Similar Same Intent

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
6.2 PROTECTION OF MATERIALS Inspections shall be performed to verify the adequacy and proper maintenance of material storage conditions and handling techniques.	7.2 Protection of Materials Inspections shall be performed to verify the adequacy and proper maintenance of material storage conditions and handling techniques.	OK
These inspections shall Include the following:	These inspections shall include the following:	OK
1. Inspection of cement storage facilities to verify weather tightness, cement temperature and the absence of lumps, and review of records to verify type and age of cement. 2. Inspection of aggregate stockpiles to verify: handling techniques are not resulting in segregation; storage and handling adequately prevent contamination with deleterious substances; proper temperature and uniform moisture control; and use of frozen materials is prevented. 3. Inspection of admixture storage and handling facilities to verify that deterioration and contamination are prevented. 4. Inspection of water sources and cooling and heating facilities to verify the specified water quality and assure that the specifications for concrete temperature are met. 5. Inspection of reinforcing material, embedments, and prestressing system materials (wire, strand, tendons, tendon tubes and temporary or permanent anchor hardware) to verify protection against corrosion, contamination and physical damage.	a) inspection of cement storage facilities to verify weather tightness, cement temperature and the absence of lumps, and review of records to verify type and age of cement; b) inspection of aggregate stockpiles to verify that: l) handling techniques are not resulting in segregation; 2) storage and handling adequately prevent contamination with deleterious substances; 3) specified temperature and uniform moisture control are maintained; and 4) use of frozen materials is prevented; c) inspection of admixture storage and handling facilities to verify that deterioration and contamination are prevented; d) inspection of water sources and cooling and heating facilities to verify the specified water quality and to assure that the specifications for concrete temperatures are met; e) inspection of reinforcing material, embedments, and prestressing systems materials (wire, strand, tendons, tendon tubes, and temporary or permanent anchor hardware) to verify protection against excessive corrosion, contamination, and physical damage.	OK
6.3 MEASURING, MIXING, AND TRANSPORTING EQUIPMENT Inspections shall be performed prior to and during the production of concrete to verify the adequacy and proper operation of measuring, mixing, and transporting equipment in accordance with ACI 304, ASTM C—94, and National Ready Mix Concrete Association — Concrete Plant Standard and Truck Mixer and Agitator Standard.	7.3 Measuring, Mixing, and Transporting Equipment Inspections shall be performed prior to and during the production of concrete to verify the adequacy and proper operation of measuring, mixing, and transporting equipment in accordance with ACI 304, ASTM C 94, and National Ready Mix Concrete Association Concrete Plant Standard and Truck Mixer and Agitator Standard.	OK
The inspections shall include time following:	These inspections shall include the following:	OK

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
(1) Inspection of measuring facilities for time specified accuracy of measuring, weighing and weight recording devices to control time following: (a) Proportions of cement, water and aggregates (b) Quantities of admixtures (c) Aggregate moisture compensation (d) Mixing time (e) Temperature control: Heating or cooling of concrete. (f) Method of adding water when batching lightweight aggregates in accordance with ACI 301.	7.3.1 Inspection of measuring facilities for the specified accuracy of measuring, weighing, and weight recording devices to control the following: (a) proportions of cement, water, and aggregates (b) quantities of admixtures (c) aggregate moisture compensation (d) mixing time (e) temperature control, heating or cooling of concrete (f) method of adding water when batching light-weight aggregates in accordance with ACI 301.	OK
(2) Inspection of central mix plant and truck mixers for wear of drum blades, availability of revolution counter and water measuring device, proper speed of rotation and ability to mix concrete completely in the specified time.	7.3.2 Inspection of central mix plant and truck mixers for wear of drum blades, availability of revolution counter and water measuring devices, proper speed of rotation, and ability to mix concrete completely in the specified time.	OK
6.4 PREPLACMENT PREPARATIONS Inspection of preparations for concrete placement shall include the following:	7.4 Preplacement Preparations Inspection of preparations for concrete placement shall include the following:	OK
1. Inspection of compacted structural fill during placement to verify correct condition. 2. Inspection of rock surfaces which will be in contact with structural concrete to verify surface cleanness, removal of loose rock and free water, correct contour and specified subgrade condition. 3. Inspection of previously placed concrete to verify proper preparation for the next lift. 4. Inspection of formwork to verify: correct location and configuration of formwork; installation and integrity of water stops and membrane waterproofing; condition of form material to produce the specified concrete finish; installation of ties, anchors, bracing, shoring and supports; correct location and dimensions of blackouts; proper form coating and cleanliness inspection of forms for water tightness and placement of grout and vent pipes when preplaced aggregate concrete is used. 5. Inspection of reinforcing steel, prestressing components (if applicable) and other embedded items to verify: correct size, number, location, position	a) inspection of the compacted structural fill or undisturbed soil to verify correct condition; b) inspection and field testing, in accordance with the specifications of all structural fill, undisturbed soil, and rock surfaces which will be in contact with structural concrete to verify surface cleanness, removal of loose rock and free water, correct contour, and specified subgrade condition; c) inspection of previously placed concrete to verify proper preparation for the next lift; d) inspection of formwork to verify: l) correct location and configuration, dimensional accuracy, and proper line and grade of form-work; 2) installation and integrity of water stops and membrane waterproofing; 3) condition of form material to produce the specified concrete finish, installation of ties, anchors, bracing, shoring, and supports to prevent movement during concrete placement; 4) correct location and dimensions of block-outs, proper form coating, and cleanness inspection of forms fore tightness and placement of grout and vent pipes when preplaced aggregate concrete is used; e) inspection of reinforcing steel, prestressing components (if applicable), and other embedded items to verity; (1) correct size, number, location, position, cleanness and leak tightness, if applicable; (2) proper stringing and absence of physical damage to pretensioning strands or tendons;	Similar Same Intent

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
6. Inspection of mechanical reinforcing bar splicing operations to verify conformance to the requirements of Section 6.12. 7. Inspection by use of a mandrel or similar device to ensure that the tendons conduits are open and remain open during the concrete placing operation. 8. Inspection of pretensioning load cells and/or pressure sages for accuracy and calibration if applicable. 9. Inspection of pretensioning system strand vises for cleanliness, proper lubrication, wear, distortion and cracking if applicable. 10. Inspection of the pretensioning operation if applicable, to verify: initial tensioning of each strand to eliminate slack and to provide a uniform initial stress condition in all strands prior to final stressing; proper measurement and correlation of Jack pressure (or load cell reading) and strand or tendon elongation; proper correction for elongation losses due to strand slippage in the rises and movement of anchorage abutments.	f) inspection of mechanical reinforcing bar splicing operations to verify conformance to the requirements of para. 7.12; g) inspection by use of a mandrel or similar device to ensure that the tendon conduits are open and remain open during the concrete placing operation; h) inspection of pretensioning load cells and pressure gages for accuracy and calibration, if applicable; i) inspection of pretensioning system strand vises for cleanness, proper lubrication, wear, distortion, and cracking, if applicable; j) inspection of the pretensioning operation, if applicable, to verify: (1) initial tensioning of each strand to eliminate slack and to provide a uniform initial stress condition in all strands prior to final stressing; (2) proper measurement and correlation of jack pressure (or load cell reading) and strand or tendon elongation; (3) proper correction for elongation losses due to strand slippage in the rises and movement of anchorage abutments; (k) inspection of groundwater control, as specified; (l) inspection of imbedments.	Similar Same Intent Item "k" added in NQA-1
Documentation of the inspections required by steps 1 through 10 above shall be verified as being complete and indicating that all inspection results are satisfactory.	Documentation of the inspections required by steps (a) through (l) above shall be verified as being complete and indicating that all inspection results are satisfactory.	OK
6.5 CONCRETE PLACEMENT Inspection of concrete placement shall be performed to verify the following:	7.5 Concrete Placement Inspection of concrete placement shall be performed to verify the following:	OK
1. Specified tests of concrete have been performed. 2. Adherence to specified requirements for class of concrete, age, rate of placement, lift height, placing sequence and hot or cold weather concreting practice. (ACI 305 or 306 respectively.) 3. Proper use of adequate conveying and placing equipment. 4. That harmful materials are not used in covering or placing equipment. 5. Adequate concrete consolidation equipment *and technique of operation.*(ACI 309) 6. Embedded items are not disturbed nor forms displaced.	a) specified tests of concrete have been performed; b) adherence to specified requirements for class of concrete, age, rate of placement, lift height, placing sequence, concrete temperature, and hot or cold weather concreting practice (ACI 305 or ACI 306, respectively); c) proper use of adequate conveying and placing equipment; (d) harmful materials are not used in covering or placing equipment; *e) adequate concrete consolidation equipment* and technique of operation (ACI 309); f) embedded items are not disturbed nor forms displaced.	OK
6.6 FINISHING AND REPAIRS Inspections shall be performed to verify that specified finishes are obtained; i.e., wood float, steel trowel, as cast or other type.	7.6 Finishing and Repairs Inspections shall be performed to verify that specified finishes are obtained, i.e., wood float, steel trowel, as cast, or other type.	OK

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
After forms have been removed, inspections shall be performed to verify that the formed surfaces have been repaired and finished in accordance with specified requirements.	After forms have been removed, inspections shall be performed to verify that the formed surfaces have been repaired and finished in accordance with specified requirements.	OK
Any indications of voids or contamination, such as at a construction joint, shall be explored by physical removal of concrete if necessary to determine the extent of such voids or contamination.	Any indication of voids or contamination, such as at a construction joint, shall be explored by physical removal of concrete, if necessary, to determine the extent of such voids or contamination.	OK
Appropriate repairs shall be made.	Appropriate repairs shall be made.	OK
6.7 Curing	7.7 Curing	OK
	Qualification tests shall be performed on liquid membrane forming curing compounds and sheet materials for concrete curing for compliance with ASTM C 309 in accordance with test methods given therein or ASTM C 171, as applicable.	These words were added in NQA-1
Inspections shall be performed throughout the specified curing period to verify the following:	Inspections shall be performed throughout the specified curing period to verify the following:	OK
I. Correct curing method is used, i.e., use of ponding, fog spray, wet burlap, curing compound, or other method in accordance with specified requirements. 2. Concrete is kept continuously, i.e., not periodically, wet during the entire curing period, if one of the wet curing methods is used. 3. Membrane curing compounds are specifically approved for use prior to application. 4. Curing temperature is maintained within specified limits during the entire curing period. 5. Shoring and forms are left in place and precast concrete members are left in the forms until concrete has reached the specified strength necessary to preclude the possibility of damage from construction loads. 6. Concrete test cylinders are subjected to the same curing process as the concrete when field cured cylinders are required to evaluate curing methods.	a) correct curing method is used, i.e., use of ponding, fog spray, wet burlap, curing compound, or other methods in accordance with specified requirements; b) concrete is kept continuously, i.e., not periodically, wet during the entire curing period, if one of the wet curing methods is used; c) membrane curing compounds are specifically approved for use prior to application; d) curing temperature is maintained within specified limits during the entire curing period; e) shoring and forms are left in place, and precast concrete members are left in the forms until concrete has reached specified strength necessary to preclude the possibility of damage from construction loads; f) concrete test cylinders are subjected to the same curing process as the concrete when field cured cylinders are required to evaluate curing methods.	OK
6.8 Stress Transfer of Pretensioned Members If applicable, inspections shall be performed to verify that:	7.8 Stress Transfer of Pretensioned Members If applicable, inspections shall be performed to verify the following:	OK

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
1. The concrete strength, as indicated by test cylinders, is in accordance with the specified transfer strength prior to the transfer of prestressing load from the bed to the member. 2. Stress transfer is performed within the specified temperature limits for heat-cured members. 3. Forms, ties, inserts, hold downs or other devices that would restrict longitudinal movement of the member(s) along the bed are removed, or loosened in a specific sequence prior to or in conjunction with stress transfer. 4. The stress transfer is performed in a sequence which avoids overstressing or cracking of the member due to unacceptable non-symmetrical loading.	a) the concrete strength, as indicated by test cylinders, is in accordance with the specified transfer strength prior to the transfer of prestressing load to the member; b) stress transfer is performed within the specified temperature limits for heat cured members; c) forms, ties, inserts, hold downs, or other devices that would restrict longitudinal movement of the member(s) are removed, or loosened in a specific sequence to or in conjunction with stress transfer; d) the stress transfer is performed following an approved stressing procedure.	Similar Same Intent
6.9 Post Tensioning Inspections shall be performed prior to and during post-tensioning, if applicable, to verify the following:	7.9 Post-Tensioning Inspections shall be performed prior to and during post-tensioning, if applicable, to verify the following:	OK
I. The concrete strength, as indicated by test cylinders is in accordance with the specified strength at time of prestress or at the time of post-tensioning. 2. The tendons and tendon ducts of ungrouted tendons have been treated with the specified lubricant and/or corrosion inhibiting compound prior to tendon installation. 3. The tendons are tensioned (from both ends if so specified) in accordance with the specified pre-stressing sequence. 4. There is proper measurement and correlation of jack pressure (or load cell reading) and tendon elongation as well as proper correction for elongation and/or prestress seating losses. 5. The anchorage details (buttonheads, friction grip, wedge grip, threaded, etc.) are in accordance with the specified requirements both prior to and after tensioning. 6. The grouted tendon ducts are free from excessive moisture prior to tendon installation and kept dry prior to grouting; the grout material and the grouting operation are	a) the concrete strength, as indicated by test cylinders, is in accordance with the specified strength at the time of prestress or at the time of post-tensioning; b) the tendons and tendon ducts of ungrouted ten-dons have been treated with the specified lubricant, or corrosion-inhibiting compound, prior to tendon installation; c) the tendons are tensioned (from both ends if so specified) in accordance with the specified prestressing sequence; d) there is proper measurement and correlation of jack pressure (or load cell reading) and tendon elongation as well as proper correction for elongation, or prestress seating losses; e) the anchorage details (buttonheads, friction grip, wedge grip, threaded, etc.) are in accordance with the specified requirements both prior to and after tensioning; f) the grouted tendon ducts are free from excessive moisture prior to grouting; the grout material and the grouting operation are in accordance with specified requirements.	OK
6.10 Shipping and Handling of Precast Concrete Members	7.10 Shipping and Handling of Precast Concrete Members	OK
Shipping and handling of precast concrete members shall be in accordance with the requirements of ANSI N45.2.2.	N45.2.2 incorporated into NQA-1 as Subpart 2.2.	Specific provisions of Subpart 2.2 which are applicable to project activities will be defined in associated procedures.

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
Specifically, inspections shall be performed prior to and during erection to verify the following:	Inspections shall be performed prior to and during erection to verify the following:	OK
1. Members are handled only by means of approved devices at designated locations or pick-up points. 2. Suitable foundations are provided for storage of precast members. 3. Stacked members are separated and supported by battens placed across the full width of the designated bearing points. 4. Shipping and handling has not caused unacceptable cracking, spalling, or chipping of the precast members, using acceptance criteria at least equivalent to those of ACI Committee Report 533, "Design of Concrete Wall Panels, Chapter 17, Cracking Acceptability."	a) members are handled only by means of approved devices at designated locations or pick-up points; b) suitable foundations are provided for storage of precast members; c) stacked members are separated and supported by battens placed across the full width of the designated bearing points; d) cracking, spalling, and other defects caused by shipping and handling of the precast members do not exceed the specified limits.	OK
6.11 In-Process Tests on Concrete and Reinforcing and Prestressing Steels In-process tests shall be performed during the course of construction to maintain control of structural, prestressed and precast concrete.	7.11 In-Process Tests on Concrete and Reinforcing and Prestressing Steel In-process tests shall be performed during the course of construction to maintain control of structural, prestressed, and precast concrete.	OK
A list of the required in-process tests is contained in Table B.	The tests which are required and the frequency shall be in accordance with the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359) except as follows. The ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359) test frequencies for the following tests shall be considered minimum, unless current documentary test data are available to establish adequate confidence in conformance of materials to specified requirements. a) for concrete materials — unit weight/yield b) for aggregate materials 1) unit weight of aggregate 2) fixed water and iron content of aggregate only for radiation-shielding concrete 3) organic impurities 4) flat and elongated particles 5) lightweight particles 6) soft fragments 7) specific gravity and absorption 8) Los Angeles abrasion 9) potential reactivity 10) soundness	Similar Same Intent

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
The test frequencies given shall be considered minimums.	The reduction of frequency of testing must be documented, and referenced documentation must be representative of the material currently being certified with the results of prior testing.	Similar Similar Intent
In-process tests shall be performed more frequently if test results are erratic or if the trend of results or an apparent change in material characteristics indicates that the frequency should be increased.	In-process tests shall be performed more frequently if test results are erratic, or if the trend of results or an apparent change in material characteristics indicates that the frequency should be increased.	OK
Samples for in-process tests of concrete shall be taken following the procedures of ASTM C- 172 except as defined herein regarding location of sampling.	Samples for in-process tests of concrete shall be taken following the procedures of ASTM C 172, except as defined herein regarding location of sampling.	OK
No water or other ingredients may be added to any concrete batch after making the in-process tests.	No water or other ingredients may be added to any concrete batch after making the in-process tests.	OK
Samples shall not be taken from concrete deposited in the form.	Samples shall not be taken from concrete deposited in the form.	OK
Except as noted below for pumped concrete and when correlation testing is performed, the sampling point for taking in-process test samples of plastic concrete shall be performed at the placement point, or other points coincident thereto.	Except as noted below, the sampling point for taking in-process test samples of plastic concrete shall be performed at the placement point or other points coincident thereto.	OK
In the case where concrete is pumped during its movement from the delivery point to the placement point, in-process strength samples shall be taken at the placement point, unless correlation tests of air content, slump, and temperature are performed.	When concrete is pumped during its movement from the delivery point to the placement point, in-process strength samples shall be taken at the placement point, unless correlation tests of air content, slump, and temperature are performed.	OK
Where correlation testing is in effect, in-process strength samples may be taken at the delivery point.	When correlation testing is in effect, in-process strength samples may be taken at the delivery point.	OK
In-process strength testing conducted at the mixing point is permitted, but unless the mixing point and the delivery point are considered coincident, correlation strength tests between samples taken at the mixing point and the delivery point are required.	In-process strength testing conducted at the mixing point is permitted, but unless the mixing point and the delivery point are considered coincident, correlation strength tests between samples taken at the mixing point and the delivery point are required.	OK
In this case the frequency of the correlation of strength samples taken at the delivery point shall be each 500 cubic yards of concrete or twice each week, which-ever provides the greater number of samples.	In this case, the frequency of the correlation of strength samples taken at the delivery point shall be taken each 500 cu yd (382 in3) of concrete or twice each week, whichever provides the greater number of samples.	OK

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5 - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
If sampling is not accomplished at the placement point and if the delivery point and the placement point are not considered coincident, correlation tests will be established and performed for air content, slump, and temperature.	If sampling is not accomplished at the placement point and if the delivery point and the placement point are not considered coincident, correlation tests will be established and performed for air content, slump, and temperature.	OK
The frequence of correlation tests shall be at an interval four times greater than that noted in Table B for in-process tests.	The frequency of the correlation tests shall be at an interval of four times greater than the required test frequency.	Similar Same Intent
When any of the specified limits and tolerances on loss of air content, slump, or temperature are exceeded at the placement point, correlation strength tests between the delivery point and the placement point shall be accomplished for each 100 cubic yards of concrete placed as long as limits and tolerances are exceeded. If no limits and tolerances are specified, the ASTM C-94 shall apply.	When any of the specified limits and tolerances on loss of air content, slump, or temperature are exceeded at the placement point, correlation strength tests between the delivery point and the placement point shall be accomplished for each 100 cu yd (76.5 in3) of concrete places as long as limits and tolerances are exceeded. If no limits and tolerances are specified, ASTM C 94 shall apply.	OK
6.12 Mechanical (Cadweld) Splice Testing	7.12 Mechanical (Sleeve With Ferrous Filler Metal) Splice Testing	OK
	The mechanical (sleeve with ferrous filler metal) splice testing shall be done in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	These words were added in NQA-1
6.12.1 Qualification of Operators. Prior to the production splicing of reinforcing bars, each member of the splicing crew (or each crew if the members work as a crew) shall prepare two qualification splices on the largest bar size for each of the splice positions (e.g., horizontal, vertical, diagonal) to be used.	The mechanical (sleeve with ferrous filler metal) splice testing shall be done in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
The qualification splices shall be made using the same materials (e.g., bar, sleeve, powder) as those to be used in the structure.	The mechanical (sleeve with ferrous filler metal) splice testing shall be done in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
To qualify, the completed splices must meet the specified visual inspection acceptance requirements of paragraph 6.12.2 and meet the tensile test requirements of paragraph 6.123.	The mechanical (sleeve with ferrous filler metal) splice testing shall be done in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
Each member of the splicing crew (or each crew if the members work as a crew) is subject to requalification (1) if the specific splice position (e.g., horizontal, vertical, diagonal) has not been used by member or crew for a period of three months or more or (2) if there has been an increase in bar size beyond one bar size up or (3) if there is a reason to question their ability, such as the completed splices not passing visual inspection or tensile testing.	The mechanical (sleeve with ferrous filler metal) splice testing shall be done in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
The requalification procedure should be identical to the initial qualification procedure.	The mechanical (sleeve with ferrous filler metal) splice testing shall be done in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
6.12.2 Visual Inspection. All completed mechanical splices shall be cooled to ambient temperature prior to being visually inspected at both ends of the splice sleeve and at the tap hole in the center of the splice sleeve for longitudinal centering of sleeve on the spliced ends, allowable voids in filler metal; extent of leaking of filler metal, gas blowout, amount of packing and slag at the tap hole.	The mechanical (sleeve with ferrous filler metal) splice testing shall be done in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
Splices that fail to pass visual inspection shall be discarded and replaced and shall not be used as tensile test samples.	The mechanical (sleeve with ferrous filler metal) splice testing shall be done in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
6.12.3 Tensile Testing. Splice samples may be production splices (i.e., those cut directly from in-place reinforcing) or sister splices (i.e., those removable splices made in place next to production splices and under the same conditions).	The mechanical (sleeve with ferrous filler metal) splice testing shall be done in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
A record shall be kept of all splices tested, showing the splice location, splice identification number, and whether the tested splice was a production or sister splice. Splice samples shall be subjected to tensile tests in accordance. with the sampling frequency specified in Section 6.12.4 to determine conformance with the tensile requirements set forth in Table CB-4330-I of the ASME Code Sec. III, Div. 2.	The mechanical (sleeve with ferrous filler metal) splice testing shall be done in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
Splice samples shall be subjected to tensile tests in accordance. with the sampling frequency specified in Section 6.12.4 to determine conformance with the tensile requirements set forth in Table CB-4330-I of the ASME Code Sec. III, Div. 2.	The mechanical (sleeve with ferrous filler metal) splice testing shall be done in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
Since curved reinforcing bars will not tensile test accurately, production splice samples shall not be re-moved from curved reinforcing bars for tensile testing.	The mechanical (sleeve with ferrous filler metal) splice testing shall be done in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
Straight sister splice samples shall be made for each of the required curved reinforcing bar production splices.	The mechanical (sleeve with ferrous filler metal) splice testing shall be done in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
Production samples shall also not be cut from the structure where the mechanical splicing sleeve is welded to an anchorage in a region of high stress concentration, or at a leak tight barrier (e.g., embedded structural steel sections or liner plate	The mechanical (sleeve with ferrous filler metal) splice testing shall be done in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
Representative sister splice samples shall be used in such cases.	The mechanical (sleeve with ferrous filler metal) splice testing shall be done in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
The sampling frequency specified in Section 6.12.4(2) shall then be followed, except that all splices tested shall be sister splices.	The mechanical (sleeve with ferrous filler metal) splice testing shall be done in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
6.12.4 Tensile Test Frequency. Separate test cycles shall be established for mechanical splices in horizontal, vertical, and diagonal bars, for each bar size as follows:	The mechanical (sleeve with ferrous filler metal) splice testing shall be done in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
1. Test Frequency for Production Splice Test Samples. If only production splices are tested, the sample frequency shall be: a. One of the first 10 splices. b. One of the next 90 splices. c. Two of the next and subsequent units of 100 splices.	The mechanical (sleeve with ferrous filler metal) splice testing shall be done in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
2. Test Frequency for Combination of Production and Sister Splices. If production and sister splices are tested, the sample frequency shall be: a. One production splice of the first 10 splices. b. One production and three sister splices for the next 90 production splices. c - One splice either production or sister splice, for the next and subsequent units of 33 splices. At least ¼ of the total number of splices tested shall be production splices -	The mechanical (sleeve with ferrous filler metal) splice testing shall be done in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5 - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
6.13 Welded Reinforcing Bar Splices Welded reinforcing bar splices shall be subject to the requirements of Section 7.5 of this Standard except that provisions of Subsection CC-4334 of ASME Code Section III, Division 2 shall apply.	7.13 Welded Reinforcing Bar Splices Welded reinforcing bar splices shall be subject to the requirements of para. 8.5, except that provisions of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359) shall also apply.	Similar Same Intent
7. INSPECTION OF STEEL CONSTRUCTION 7.1 General	8 INSPECTION OF STEEL CONSTRUCTION 8.1 General	OK
	Structural steel qualification shall be documented by manufacturer's certification showing conformance to specifications such as ASTM A 36, A 441, or as otherwise specified.	These words were added in NQA-1
Inspection of steel construction in accordance with the "AISC Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings" as contained in the AISC Manual of Steel Construction shall include inspection of assembly and erection operations, fastening or connecting operations such as high strength bolting and welding and finishing operations to include cleaning and protective painting or coating.	Inspection of steel construction in accordance with the AISC S326, Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings shall include inspection of assembly and erection operations, fastening or connecting operations such as high strength bolting and welding, and finishing operations to include cleaning and protective painting or coating.	OK
Inspection of steel construction shall include inspection of related items, such as anchor bolts and base plates, which may be part of the supporting structure and installed as part of structural concrete work.	Inspection of steel construction shall include inspection of related items, such as anchor bolts and baseplates, which may be part of the supporting structure and installed as part of the structural concrete work.	OK
Table B Required In-Process Test	Required tests are delineated within body of Subpart 2.5	Similar Same Intent
7.2 Supporting Structures Prior to erection of steel, anchor bolts, base plates, and other structural embedments shall be checked for correct orientation, spacing, and elevation. Base plate surfaces and supporting concrete surfaces shall be checked to verify satisfactory condition for grouting.	8.2 Supporting Structures Prior to erection of steel, anchor bolts, baseplates, and other structural embedments shall be checked for correct orientation, spacing, and elevation. Baseplate surfaces and supporting concrete surfaces shall be checked to verify satisfactory conditions for grouting.	OK
Grouting of base plates, beam pockets, etc., shall be controlled and inspected to verify that only specified materials are used, proportioned properly, placed correctly, and cured properly to achieve the specified compressive strength -	Grouting of baseplates, beam pockets, etc., shall be controlled and inspected to verify that only specified materials are used, proportioned properly, placed correctly, and cured properly to achieve the specified compressive strength.	OK

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
7.3 Assembly and Erection Assembly and erection operations shall be inspected to verify compliance with installation procedures and work instructions. Alignment operations shall be carried out early enough and as often as is necessary as erection progresses to ensure that specified requirements are met	8.3 Assembly and Erection Assembly and erection operations shall be inspected to verify compliance with installation procedures and work instructions. Alignment operations shall be carried out early enough and as often as is necessary as erection progresses to ensure that specified requirements are met.	OK
Particular attention shall be given to verification of the condition of contact surfaces of friction type connections and bolt hole alignment.	Particular attention shall be given to verification of the condition of contact surfaces of friction type connections and bolt hole alignment.	OK
Correction of fabrication errors shall be closely controlled to prevent correction of misaligned holes by reaming in excess of AISC tolerances.	Correction of fabrication errors shall be closely controlled to prevent correction of misaligned holes by reaming in excess of AISC tolerances.	OK
Burning of bolt holes is not permitted.	Burning of bolt holes is not permitted.	OK
All equipment used in connecting operations shall be inspected to verify conformance with specification requirements.	Equipment used in connecting operations shall be inspected to verify conformance with specification requirements.	OK
For example, air compressors must be of sufficient capacity to maintain the required operating pressures for impact tools.	For example, air compressors shall be of sufficient capacity to maintain the required operating pressures for impact tools.	OK
7.4 High Strength Bolting Bolt tightening shall be in accordance with the specified method, i.e., automatic cut-off impact wrench, turn-of-nut method, or direct-tension indicator. If the turn-of-nut method is used, inspections shall be made to verify that the bolting crews understand the meaning of "snug tight" condition before the nut is turned through the required angle	8.4 High Strength Bolting Bolt tightening shall be in accordance with the specified method, e.g., automatic cut-off impact wrench, turn-of-nut method, or direct-tension indicator. If the turn-of-nut method is used, inspections shall be made to verify that the bolting crews understand the meaning of snug tight condition before the nut is turned through the required angle.	OK
If an automatic cut-off impact wrench is used, it shall be calibrated at least twice daily.	If an automatic cut-off impact wrench is used, it shall be calibrated at least twice daily.	OK
The calibration of automatic cut-off impact wrenches shall be performed by tightening in a device capable of indicating actual bolt tension, using no less than three typical bolts of each diameter from the bolts being installed.	The calibration of automatic cut-off impact wrenches shall be performed by tightening in a device capable of indicating actual bolt tension, using no less than three typical bolts of each diameter from the bolts being installed.	OK
Installation of bolts shall be done in accordance with "Specifications for Structural Joints Using ASTM A-325 or A-490 Bolts."	Installation of bolts shall be done in accordance with AISC 5329, Specifications for Structural Joints Using ASTM A 325 or A 490 Bolts.	OK
	Qualification of bolts shall be documented by manufacturer's certification or as otherwise specified	These words were added in NQA-1

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
7.4.1 Inspection of Bolting. Inspection of bolting shall include visual inspections of bolting operations and torque wrench inspection of completed connections.	8.4.1 Inspection of Bolting. Inspection of bolting shall include visual inspection of bolting operations and torque wrench inspection of completed connections.	OK
Connection points shall be visually inspected for the following items: 1. Bolts are long enough as indicated by the point of the bolts being flush with or outside the face of the nuts. 2. Correct type bolt is used as indicated by the manufacturer's marking on the head. 3. Torque has been applied as indicated by the burnishing or peening of the corners of the nut. 4. Turning elements are on the correct face; properly sized washers are used when required.	Connection points shall be visually inspected for the following items: (a) bolts are long enough as indicated by the point of the bolts being flush with or outside the face of the nuts; (b) correct type bolt is used as indicated by the manufacturer's marking on the head; Cc) torque has been applied as indicated by the burnishing or peening of the corners of the nut; (d) turning elements are on the correct face; properly sized washers are used when required.	OK
The schedule bolt tension inspection shall be as specified in the latest edition of "Specification for Structural Joints Using ASTM A-325 or A-490 Bolts".	Bolt tension inspection shall be as specified in AISC 5329, Specification for Structural Joints Using ASTM A 325 or A 490 Bolts.	OK
In addition, during the initial phase of bolting operations, all bolts tightened by each bolting crew shall be checked until the results are consistently acceptable.	In addition, during the initial phase of bolting operations, all bolts tightened by each bolting crew shall be checked until the results are consistently acceptable.	OK
7.4.2 Inspection Tools and Procedure. Hand torque wrenches used for inspection shall be controlled in accordance with paragraph 2.5.2 and must be calibrated at least weekly and more often if deemed necessary.	8.4.2 Inspection Tools and Procedure. Hand torque wrenches used for inspection shall be controlled in accordance with Part I, Basic and Supplementary Requirements, and shall be calibrated at least weekly, more often if deemed necessary.	OK
Impact torque wrenches used for inspection must be calibrated at least twice daily.	Impact torque wrenches used for inspection shall be calibrated at least twice daily.	OK
Feeler gauges used for inspection of direct-tension indicators shall be controlled in accordance with paragraph 2.5.2.	Feeler gauges used for inspection of direct-tension indicators shall be controlled.	Similar Same intent
7.5 Welding Inspection of structural steel welding shall be performed in accordance with the provisions of AWS DI .1, Section 6, entitled "Structural Welding Code," and supplemental addenda.	8.5 Welding Inspection of structural steel welding shall be per-formed in accordance with the provisions of Section 6.0 of AWS DI.1, Structural Welding Code— Steel.	Similar Same Intent
This inspection shall include visual examination of preparations, welding processes, and post-welding operations and if deemed necessary some NDE inspections which are appropriate to the application.	This inspection shall include visual examination of preparations, welding processes, post-welding operations, and if deemed necessary, some NDE inspections which are appropriate to the application.	OK
Prior to welding, verification of welding procedure and welder qualification shall be documented and shall include all essential variables identified in the procedure.	Prior to welding, verification of welding procedure and welder qualification shall be documented and shall include all essential variables identified in the procedures.	OK

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
In-process inspections shall include acceptability of environmental conditions, joint fit up prior to start of welding, preheat and interpass temperature requirements, filler metal, control of distortion, and post-weld heat treatment and cleaning requirements.	In-process inspections shall include acceptability of environmental conditions, joint fit-up prior to start of welding, preheat and interpass temperature requirements, filler metal, control of distortion, post-weld heat treatment, and cleaning requirements.	OK
Procedures shall be established to control the purchase, receiving, distribution, storage, and use of welding electrode.	Procedures shall be established to control the purchase, receiving, distribution, storage, and use of welding electrodes.	OK
	Weld repairs necessitated by visual or nondestructive examinations shall be made in accordance with the procedure used to perform the original weld or a qualified repair procedure and reinspected by the same method that disclosed the repairable defect.	These words were added in NQA-1
	All weld repairs necessitated by nondestructive examination shall be documented.	These words were added in NQA-1
8. DATA ANALYSIS AND EVALUATION 8.1 General Procedures shall be established for processing inspection and test data and their analysis and evaluation.	9 DATA ANALYSIS AND EVALUATION 9.1 General Procedures shall be established for processing inspection and test data and their analysis and evaluation.	OK
These procedures shall provide for acquisition and preparation of inspection and test data for prompt evaluation against acceptance criteria, operating limits, and performance standards.	These procedures shall provide for acquisitions and preparation of inspection and test data for prompt evaluation against acceptance criteria, operating limits, and performance standards.	OK
The data processing procedures shall provide for "on-the-spot" evaluation to determine the validity of the inspection and test results and the appropriateness of continuing the inspection or test.	The data processing procedures shall provide for on-the-spot evaluation to determine the validity of the inspection and test results and the appropriateness of continuing the inspection or test.	OK
The data shall be analyzed and evaluated to verify completeness of results, achievement of inspection and test objectives, and to identify additional inspection and tests required; and necessary changes to the installation inspection or test procedures.	The data shall be analyzed and evaluated to verify completeness of results and achievement of inspection and test objectives; and to identify additional inspection and tests required, and necessary changes to the installation inspection or test procedures.	OK
Inspection and test results that include inspection and test data, together with a report of data analysis and evaluation, shall be provided as specified in Section 9.	Inspection and test results that include inspection and test data, together with a report of data analysis and evaluation, shall be provided as specified in Section 10.	OK
8.2 Concrete and Mechanical (Cadweld) Splice Test Data Evaluation and Analysis 8.2.1 Evaluation of Concrete Test Results. Standard deviation data shall be developed, evaluated, and maintained for permanent records in accordance with ACI 214.	9.2 Concrete and Mechanical (Sleeve With Ferrous Filler Metal) Splice Test Data Evaluation and Analysis 9.2.1 Evaluation of Concrete Test Results. Standard deviation data shall be developed, evaluated, and maintained for permanent records in accordance with ACI 214.	OK

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
Concrete quality and acceptance criteria shall conform to the requirements of ACI 318, Chapter 4.	Concrete quality and acceptance criteria shall conform to the requirements of ACI 318, Chapter 4.	OK
8.2.2 Evaluation of Mechanical (Cadweld) Splice Test Results. The following procedure shall be used for substandard tensile test results:	9.2.2 Evaluation of Mechanical Splice Test Results. The evaluation of mechanical splice test results shall be in accordance with ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
1. If any production or sister splice tested fails to meet the tensile test specification of paragraph 6.12.3 and the observed rate of splices that fail the tensile test at that time does not exceed one for each 15 consecutive test samples, the *sampling procedure shall be started anew.*	9.2.2 Evaluation of Mechanical Splice Test Results. The evaluation of mechanical splice test results shall be in accordance with ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
If any production or sister splice used for testing fails to meet the tensile test specification in paragraph 6.12.3 and the observed rate of splices that fail the tensile test exceeds one for each 15 consecutive test samples, mechanical splicing shall be stopped.	9.2.2 Evaluation of Mechanical Splice Test Results. The evaluation of mechanical splice test results shall be in accordance with ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
In addition, the adjacent production splices on each side of the last failed splice and four other splices distributed uniformly throughout the balance of the 100 production splices under investigation shall be tested, and an analysis shall be made to identify the cause of all failures.	9.2.2 Evaluation of Mechanical Splice Test Results. The evaluation of mechanical splice test results shall be in accordance with ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
The results of these tests shall be evaluated by the responsible engineering organization to determine the corrective action.	9.2.2 Evaluation of Mechanical Splice Test Results. The evaluation of mechanical splice test results shall be in accordance with ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
The responsible engineering organization shall specify the extent of repairs necessary and the actions required to prevent further failures from the identified causes.	9.2.2 Evaluation of Mechanical Splice Test Results. The evaluation of mechanical splice test results shall be in accordance with ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
If two or more splices from any of these six additional splice samples fail to meet the tensile test specification of paragraph 6.12.3, the balance of the 100 production splices under investigation shall be evaluated by the responsible engineering organization to determine the corrective action.	9.2.2 Evaluation of Mechanical Splice Test Results. The evaluation of mechanical splice test results shall be in accordance with ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
When mechanical splicing is resumed, the sampling procedure shall be started anew.	9.2.2 Evaluation of Mechanical Splice Test Results. The evaluation of mechanical splice test results shall be in accordance with ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
2. If the average tensile strength of the 15 consecutive samples fails to meet the provisions of paragraph 6.12.3, the responsible engineering organization shall evaluate and assess the acceptability of the reduced average tensile strength with respect to the required strength of the location from which the samples were taken.	9.2.2 Evaluation of Mechanical Splice Test Results. The evaluation of mechanical splice test results shall be in accordance with ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	Similar Same Intent
8.2.3 Evaluation of Aggregate Test Results. When any aggregate tests specified fail to meet the specified requirements, two additional tests shall be made from samples of the same lot of aggregate.	9.2.3 Evaluation of Aggregate Test Results When any aggregate tests specified fail to meet the specified requirements, two additional tests shall be made from samples of the same lot of aggregate.	OK
If one or both of the two additional tests fail to meet the specified requirements, the data shall be submitted to the responsible engineering organization for evaluation and corrective action.	9.2.3 If one or both of the two additional tests fails to meet the specified requirements, the data shall be submitted to the responsible engineering organization for evaluation and corrective action.	OK
8.3 Steel Construction Test Data Evaluation and Analysis This data shall be evaluated for conformance to project specifications, the AISC Manual of Steel Construction, and AWS DI .1 and supplemental addenda.	9.3 Steel Construction Test Data Evaluation and Analysis This data shall be evaluated for conformance to project specifications of the AISC MO11, Manual of Steel Construction and AWS D1.1, Structural Welding Code — Steel.	Similar Same Intent
8.4 Soils Test Data Evaluation and Analysis This data shall be evaluated daily during progress of the work for conformance to project specifications.	9.4 Soils Test Data Evaluation and Analysis This data shall be evaluated daily during progress of the work for conformance to project specifications.	OK
The control techniques given in the specifications such as specific test methods for the type of soil compacted must be verified.	The control techniques given in the specifications, such as specific test methods for the type of soil compacted, shall be verified.	OK
Data must include determination of parameters specified including use of proper materials, amounts and uniformity of soil moisture, thickness of layers being placed, and finally, determination of specified compacted values by specified tests of in-place density and attainment of specified values.	Data shall include determination of parameters specified, including use of proper materials, amounts and uniformity of soil moisture, and thickness of layers being placed. In-place compacted fill density shall be determined using standard approved methods and the results evaluated for compliance to specified requirements.	Similar Same Intent
Data shall include verification that the soils are fully compacted or consolidated to contours and grades specified.	Data shall include verification that the soils are fully compacted or consolidated to contours and the grades specified.	OK
When statistical methods are required by the specification, the desired level of confidence must be specified.	When statistical methods are required by the specification, the desired level of confidence shall be specified.	OK

Enclosure 4, Table 5
ANSI N45.2.5-1978 vs NQA-1-1994, Subpart 2.5

ANSI N45.2.5. - 1978	NQA-1 (1994) Subpart 2.5 (except as noted)	Comments
9. RECORDS Record copies of completed procedures, reports, personnel qualification records, test equipment calibration records, test deviation or exception records, and inspection and examination records shall be prepared.	10 RECORDS Record copies of procedures, reports, personnel qualification records, test equipment calibration records, test deviation or exception records, and inspection and examination records shall be prepared.	OK
These shall be placed with other project records as required by code, standard, specification, or project procedures.	These shall be retained with other project records as required by code, standard, specification, or project procedures.	OK
Collection, storage, and maintenance of records shall be in accordance with requirements of ANSI N45.2.9.	N45.2.9 incorporated into NQA-1 as Basic Requirement 17 and Supplement 17S-1.	QAPP Section 4.17 commits to Basic Requirement 17 and Supplement 17 S-1.
10. REVISION OF AMERICAN NATIONAL STAN-DARDS REFERRED TO IN THIS DOCUMENT When any of the following standards referred to in this document is superseded by a revision approved by the American National Standards Institute, the revision is not mandatory until it has been incorporated as a part of this Standard.	These documents incorporated into NQA-1	
N45 2 Quality Assurance Program Requirements for Nuclear Power Plants N45 .2.2 Packaging, Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants. N45.2.3 Housekeeping During the Construction Phase of Nuclear Power Plants N45 .2.6 Qualifications of Inspection, Examination and Testing Personnel for the Construction Phase of Nuclear Power Plants N45 .2.9 Requirements for Collection, Storage, and Maintenance of Quality Assurance Records for Nuclear Power Plants N45.2.I0 Quality Assurance Terms and Definitions	These documents incorporated into NQA-1	
APPENDIX (This Appendix is not a part of ANSI Standard N45.2.5 but is included for information purposes only.) NONMANDATORY APPENDIX A (Ust of Reference Documents)	NQA-1 Part II Introduction includes similar language with the same intent: 7 REFERENCED CODES, STANDARDS, AND SPECIFICATIONS All codes, standards, and specifications that are referenced as a part of this Part (Part II) are listed in the Table entitled "Codes, Standards, and Specifications Referenced in Text."	Similar Same intent

Enclosure 4, Table 6
ANSI N45.2.8-1975 vs NQA-1-1994, Subpart 2.8

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
1. INTRODUCTION **1.1 Scope** This standard contains requirements and guidelines to assure the quality of important items of nuclear power plants including structures, systems and components.	**Introduction** **Section 1 "Purpose"** This Part (Part II) sets forth the quality assurance requirements for the planning and execution of identified tasks during the fabrication, construction, modification, repair, maintenance, and testing of systems, components, and structures for nuclear facilities.	Slightly different words, but same intent.
The requirements and guidelines are intended to assure that these important items are installed, inspected and tested in a manner that will provide adequate confidence that they will perform satisfactorily in service.	**1 GENERAL** Subpart 2.8 provides amplified requirements for installation, inspection, and testing of mechanical equipment and systems.	N45.2.8 includes "in a manner that will provide adequate confidence that they will perform satisfactorily in service."
The requirements and guidelines for installation, inspection and testing activities during construction are intended to assure the quality of mechanical items not covered by Section III of the ASME Boiler and Pressure Vessel Code.		Guidance only. Wording does not establish requirements.
The requirements of this standard deal with the protection and control necessary to assure that the requisite quality of mechanical items of the plant are preserved from the time items are removed from storage or receiving until they are incorporated into the plant up to but not including fuel loading of PWR plants and the completion of cold functional testing of BWR and HTGR plants.		Guidance only. Wording does not establish requirements.
This standard is intended to be used in conjunction with ANSI N45.2. If any conflict exists, ANSI N45.2 shall govern.	It supplements the requirements of Part I and shall be used in conjunction with applicable Basic and Supplementary Sections of Part I when and to the extent specified by the organization invoking Subpart 2.8.	Slightly different words, but same intent.
1.2 Applicability The requirements and guidelines of this standard apply to the work of any individual or organization that participates in installation, inspection or testing of mechanical equipment during construction activities of nuclear power plants as discussed in Subsection 1.1.	**Introduction** **Section 2 "Applicability"** "...The requirements of this Part (Part II) apply to fabrication, construction, modification, repair, maintenance, and testing activities that affect the quality of structures, systems, and components for nuclear facilities. These activities include the performing function of attaining quality objectives and verifying that activities affecting quality have been correctly performed. These activities include planning, subsurface investigation, fabricating, handling, shipping, storing, cleaning..."	N45.2.2 is more specific in detailing that the requirements and guidelines "apply to the work of any individual or organization". Same Intent / Result
The extent to which the individual requirements of this standard apply will depend upon the nature and scope of the work to be performed and the importance of the item or service	**Introduction** **Section 2 "Applicability"** To the extent applicable to the	N45.2.8 states that application will be dependent "upon the nature and scope of the work to be performed and the importance of the item or service involved" whereas NQA-1 states "shall

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
involved.	activities being performed, the application of this Part (Part II), or portions thereof, and the provisions of Part 1, Basic and Supplementary Requirements, shall be specified in written contracts, policies, procedures, or instructions.	be specified in written contracts, policies, procedures, or instructions. Same Intent / Result
Important mechanical items to be covered and the extent of coverage shall be identified by the individual or organization invoking this standard.	**Introduction** **Section 2 "Applicability"** To the extent applicable to the activities being performed, the application of this Part (Part II), or portions thereof, and the provisions of Part 1, Basic and Supplementary Requirements, shall be specified in written contracts, policies, procedures, or instructions.	Same Intent / Result
The requirements are intended to assure that only proper materials, equipment, processes and procedures are utilized during the construction of power plants and that the quality of items is not degraded as a result of installation, inspection and testing practices and techniques during construction.		Guidance / Context Wording
The ASME Boiler and Pressure Vessel Code (herewith referred to as the Code), as well as other American National Standards has been considered in the development of this standard, and this standard is intended to be compatible with their requirements. However, this standard does not apply to activities covered by Section III Division I and 2 and Section XI of the Code for those activities covered by the Code.		Section 1.1/1.2 of the QAPP specifies applicable Regulatory Commitments.
1.3 Responsibility The organization or organizations responsible for establishing the applicable requirements for the activities covered by this standard shall be identified and the scope of their responsibilities shall be documented.	Basic Requirement 1 The organizational structure, functional responsibilities, levels of authority, and lines of communication for activities affecting quality shall be documented. Supplement 1S-1 3.1 Where more that one organization is involved in the execution of activities covered by this Part (Part 1) the responsibility and authority of each organization shall be clearly established and documented.	Similar Same Intent
The work of establishing practices and procedures and providing the resources in terms of personnel, equipment and services necessary to implement the requirements of this standard may be delegated to other organizations and such delegation shall also be documented.	Supplement 1S-1 2.2 The individual(s) or organization(s) responsible for establishing and executing a quality assurance program under this Standard may delegate any or all of the work to others but shall retain responsibility therefor.	Similar Same intent

Enclosure 4, Table 6
ANSI N45.2.8-1975 vs NQA-1-1994, Subpart 2.8

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
It is the responsibility of each organization performing work covered by this standard to comply with the procedures and instructions issued for the project and to conform to the requirements of this standard applicable to this work.	**Introduction** **Section 3 "Responsibility"** The organization invoking this Part (Part II) shall be responsible for specifying which section, or portions thereof, apply and appropriately relating them to specific items and services. To the extent necessary, this organization shall invoke the applicable provision of Part 1, Basic and Supplementary Requirements, to specify a complete Quality Assurance Program appropriate for the specific items or services. The organization upon which this Part (Part II), or portions thereof, is invoked shall be responsible for complying with the specified requirements.	Slightly different words, but same intent.
It is the responsibility of the organization performing these activities to specify the detailed methods and procedures unless they are specified in the procurement documents.	**Introduction** **Section 3 "Responsibility"** The organization invoking this Part (Part II) shall be responsible for specifying which section, or portions thereof, apply and appropriately relating them to specific items and services. To the extent necessary, this organization shall invoke the applicable provision of Part 1, Basic and Supplementary Requirements, to specify a complete Quality Assurance Program appropriate for the specific items or services. The organization upon which this Part (Part II), or portions thereof, is invoked shall be responsible for complying with the specified requirements.	NQA-1 does not include the words "unless they are specified in procurement documents". Differences are not relevant.
1.4 Definitions The following definitions are provided to assure a uniform understanding of select terms as they are used in this standard.	**1.1 Definitions** The following definitions are provided to assure a uniform understanding of unique terms as they are used in Subpart 2.8.	OK
Acceptance Criteria — A limit or limits placed on the variation permitted in the characteristics of an item expressed in definitive engineering terms such as dimensional tolerances, chemical composition limits, density and size of defects, temperature ranges, time limits, operating parameters, and other similar characteristics.	I **Introduction** **Section 4 "Terms and Definitions"** acceptance criteria - specified limits placed on characteristics of an item, process, or service defined in codes, standards, or other required documents.	N45.2.8 is more specific in detailing definitive engineering terms. Differences are not relevant.
Checks — The tests, measurements, verifications or controls placed on an activity by means of investigations, comparisons, or examinations to determine satisfactory condition, accuracy, safety or performance.	checks — the tests, measurements, verifications, or controls placed on an activity by means of investigations, comparisons, or examinations to determine satisfactory condition, accuracy, safety, or performance	OK
Engineering Limitations — Restrictions which, if disregarded, may result in damage to the item, shortening the life of the item, or preventing the item from functioning as intended.	*engineering limitations* — restrictions which, if disregarded, may result in damage to the item, shortening the life of the item, or preventing the item from functioning as intended	OK

Enclosure 4, Table 6
ANSI N45.2.8-1975 vs NQA-1-1994, Subpart 2.8

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
Examination — An element of inspection consisting of investigation of materials, components, supplies and services to determine conformance to those specified requirements which can be determined by such investigation. Examination is usually nondestructive and includes simple physical manipulation, gaging and measurement.	*examination* — an element of inspection consisting of investigation of materials, components, supplies, and services to determine conformance to those specified requirements which can be determined by such investigation. Examination is usually nondestructive and includes simple physical manipulation, gaging, and measurement.	OK
Inspection — An element of quality control which by means of examination, observation or measurement determines the conformance of materials, supplies, components, parts, appurtenances, systems, processes or structures to predetermined quality requirements.	**I Introduction** **Section 4 "Terms and Definitions"** inspection - examination or measurement to verify whether an item or activity conforms to specified requirements.	N45.2.8 includes words "an element of quality control" and "observation" and examples of what one is trying to determine conformance of (i.e., materials, supplies, etc.). In addition, N45.2.8 states that it is to "predetermined quality requirements" whereas NQA-1 states "specified requirements". Same Intent / Result
Mechanical Items — Parts, components, or systems that function primarily for pressure retaining, mass moving, or heat exchange purposes. Examples of mechanical items are rotating equipment (motors, pumps, blowers), handling equipment (cranes, hoists, conveyors), piping systems (pipe, valves, hangers), fuel handling systems, and waste effluent systems.	*mechanical items* — parts, components, or systems that function primarily for pressure retaining, mass moving, or heat exchange purposes. Examples of mechanical items are rotating equipment (motors, pumps, blowers), handling equipment (cranes, hoists, conveyors), piping systems (pipe, valves, hangers), fuel handling systems, and waste effluent systems.	OK
Testing — The determination or verification of the capability of an item to meet specified requirements by subjecting the item to a set of physical, chemical, environmental or operating conditions.	**I Introduction** **Section 4 "Terms and Definitions"** testing - an element of verification for the determination of the capability of an item to meet specified requirements by subjecting the item to a set of physical, chemical, environmental, or operating conditions.	OK
Verification — An act of confirming, substantiating and assuring that an activity or condition has been implemented in conformance with the specified requirements.	**I Introduction** **Section 4 "Terms and Definitions"** verification - the act of reviewing, inspecting, testing, checking, auditing, or otherwise determining and documenting whether items, processes, services, or documents conform to specified requirements.	N45.2.8 states that it is an act of "confirming, substantiating and assuring" whereas NQA-1 defines it as an act of "reviewing, inspecting, testing, checking, auditing, or otherwise determining". In addition N45.2.8 states that it is "an activity or condition" whereas NQA-1 states it is "items, processes, services, or documents". Same Intent / Result
Other terms and their definitions are contained in ANSI *N45.2.10.*	**Introduction** **Section 6 "Definitions"** Definitions unique to the activities described in this Part (Part II) are included in the section dealing with that activity. Definitions generic to quality assurance activities are	Slightly different words, but same intent.

Enclosure 4, Table 6
ANSI N45.2.8-1975 vs NQA-1-1994, Subpart 2.8

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	included in Part 1, Supplement S-1, Terms and Definitions	
1.5 Referenced Documents Documents that are required to be included as a part of this standard are identified at the point of reference and described in Section 8 of this standard.	**Introduction** **Section 7 "Referenced Codes, Standards, and Specifications"** All codes, standards, and specifications that are referenced as a part of this Part (Part II) are listed in the Table entitled "Codes, Standards, and Specifications Referenced in Text."	Slightly different words, but same intent.
The issue or edition of the referenced document that is required will be specified either at the point of reference or in Section 8 of this standard unless otherwise specified in the contract document.	Codes, standards, and specifications referenced in this Part (Part II) may be identified with the applicable date or reference at the point of reference or in the Table "Codes, Standards, and Specifications Referenced in Text.	N45.2.8 includes the words "unless otherwise specified in the contract document". Same Intent / Result
2. GENERAL REQUIREMENTS This section contains requirements that are to be fulfilled by the organization or organizations responsible for performing any segment of work described in Section 3 through 5 of this standard.	**2 GENERAL REQUIREMENTS**	Guidance only. Wording does not establish requirements.
Measures shall be established and implemented for documenting the necessary installation, inspection and testing to verify conformance to specified requirements.	Measures shall be established and implemented for documenting the necessary installation, inspection, and testing to verify conformance to specified requirements.	OK

Enclosure 4, Table 6
ANSI N45.2.8-1975 vs NQA-1-1994, Subpart 2.8

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
2.1 Planning Activities shall be planned and documented to be consistent with engineering and design requirements including those which define the degree of importance to safety and reliability of the item. Planning shall define the operations to be used and the systematic, sequential progression of operations, the personnel responsibilities for each activity and the measures employed to preserve the quality of the item. Planning shall take into account the need for the identification, preparation and control of procedures and work instructions necessary to comply with requirements for installation, inspection and testing of components and systems; and the need for trained personnel necessary to comply with these procedures, work instructions, and requirements. Planning shall include a review of the system and component design specifications, procurement documents and drawings and of the construction work plans and schedules to assure that applicable installation, inspection, and testing activities have been identified; that they can be accomplished as specified; and that time and resources are sufficient to accomplish the required actions.	**2.1 Planning and Procedures** Planning and procedure preparation shall be in accordance with the requirements of the Introduction to this Part (Part II). **Introduction** **Section 4.1 "Planning"** A plan shall be developed outlining the work to be performed and the work procedures or instructions required to comply with the requirements of the defined work scope. Planning shall define the operations to be performed, the systematic sequential progression of operations, and the overall measures employed to preserve the quality of the work Planning shall include a review of the structure, system or component design/procurement specifications, materials, lists, drawings, construction work plans, and schedules to ensure that fabrication, installation, modification, inspection, testing, etc., activities have been incorporated; that the work can be accomplished as specified; and that time and resources, plus training, are sufficient to accomplish the work in accordance with the specified requirements.	Same Intent / Result
Deficiencies identified during reviews shall be brought to the attention of the responsible organization for action.	Basic Requirement 16 Conditions adverse to quality shall be identified promptly and corrected as soon as practical.	Same Intent / Effect
2.2 Procedures and Instructions Installation, inspection and test procedures and work instructions identified during planning shall be prepared and documented for those activities falling within the scope of this standard.	**Introduction** **Section 4.2 "Procedures"** Installation, inspection, test procedures, and work instructions identified during planning shall be prepared.	N45.2.8 states that procedures and instructions should be prepared and documented, NQA-1 states prepared.
Where the planning review identifies new procedures and inspections that are necessary, appropriate target dates and effort shall be scheduled for their preparation and approval.	Preparation and approval of the procedures/instructions shall be in advance of the need to use the documents.	Same Intent / Result
These documents shall be kept current *and revised as necessary to assure* that installation, inspections, and tests are performed in accordance with latest approved information and shall include as appropriate:	The documents shall be kept current *and revised as necessary to assure* that work is performed in accordance with the latest approved information. The documents shall include the following as applicable:	OK

Enclosure 4, Table 6
ANSI N45.2.8-1975 vs NQA-1-1994, Subpart 2.8

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
a. Prerequisites identified in Subsection 2.9.	(e) prerequisites including preparatory checks and inspections	NQA-1 includes the words "including preparatory checks and inspections"
b. Precautions to be observed.	(b) precautions to be observed	OK
c. Installation requirements.	(c) work requirements including installation specifications	Slightly different words, but same intent.
d. Sequential actions to be followed.	(d) sequence of activities to be followed and steps within a given activity	Slightly different words, but same intent.
e. Test objectives.	(f) test and inspection objectives	NQA-1 adds the words "and inspection"
f. Special equipment required for installation, inspection and test.	(g) special equipment required	OK
g. Identification of inspection and test equipment.	(h) identification of inspection and test equipment and related calibration requirements including recalibration dates	NQA-1 adds "and test equipment and related calibration requirements including recalibration dates"
h. Frequency of inspection or test.	(i) sequence and frequency of inspection or test	NQA-1 adds "sequence"
i. **Inspection** and test acceptance criteria.	(j) acceptance criteria and methods for verifying	NQA-1 adds "and methods for verifying"
j. Specific document references where required.	(m) specific document references	N45.2.8 adds "where required" Same Intent / Result
k. Data report forms.	(n) data or test report forms	NQA-1 adds "or test"
l. Approvals.	(l) approvals and authorizing or verifying signatures	NQA-1 adds "and authorizing or verifying signatures"
2.3 Results Inspection and test results shall be documented in a suitable test report or data sheet.	**6 Data Analysis and Evaluation** Inspection and test results supported by inspection and test data, together with a report of data analysis and evaluation, shall be provided as specified in Section 7.	N45.2.8 states "in a suitable test report or data sheet" Same Intent / Result
Each report shall identify the item to which it applies, the procedures or instruction followed in performing the task and include the following:	**BR 10 "Inspection"** Inspection results shall be documented. **BR 11 "Test Control"** Test results shall be documented. **Supplement 10S-1 "Supplementary Requirements for Inspection"** Records shall, as a minimum, identify (a) through (f) below:	These words are not included in NQA-1. Intent is encompassed by subsequent record requirements of a-f.
a. Pertinent inspection and test data.	(e) results and acceptability	Slightly different words, but same intent.
b. Significant dates and times.	(b) date of inspection	Slightly different words, but same intent.
c. Signature or stamp of inspector or tester.	(c) inspector	Slightly different words, but same intent.
d. Measuring and test equipment used where required.	(d) type of observation	Type of observation may include identification of equipment as necessary
e. Identification of nonconformances and action taken on other conditions that were not anticipated.	(f) reference to information on action taken in connection with nonconformances	Slightly different words, but same intent.
Test reports and data sheets shall include an evaluation of the acceptability of inspection and tests results and provide for identifying the individual who performed the	**6 Data Analysis and Evaluation** Procedures shall be established for processing inspection and test data and their analysis, evaluation, and	Slightly different words, but same intent.

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
evaluation.	final acceptance. These procedures shall identify individuals or *organizations responsible for the* acquisitions and reduction of inspection and test data, and evaluation against acceptance criteria, operating limits and performance standards.	
2.6 Cleaning Cleaning activities required by this standard shall be performed in accordance with ANSI N45.2.1 and Section 4 of this standard.		Specific provisions which are applicable to project activities are addressed by other portions of NQA-1 or will be defined in associated procedures if applicable to project activities.
2.5 Receiving, Storage and Handling Receiving, storage and handling activities required by this standard shall be performed in accordance with ANSI N45.2.2.		Specific provisions which are applicable to project activities are addressed by other portions of NQA-1 or will be defined in associated procedures if applicable to project activities.
2.6 Housekeeping In areas, facilities, and environments where installation, inspection and testing of mechanical items is performed in accordance with the requirements of this standard, the housekeeping requirements shall be in accordance with ANSI N45.2.3.		Specific provisions which are applicable to project activities are addressed by other portions of NQA-1 or will be defined in associated procedures if applicable to project activities.
2.7 Personnel Qualifications Those personnel who perform *inspection and testing activities* required by this standard shall be qualified in accordance with ANSI N45.2.6.	**Introduction** **Section 5 "Qualification of *Personnel*"** Inspection, test, and nondestructive examination personnel and laboratory technicians shall be trained and qualified/certified in accordance with the applicable portions of Part 1, Basic and Supplementary Requirements. Professional personnel shall meet the requirements defined by the implementing organization in its position descriptions.	Slightly different words, but same intent.
2.8 Measuring and Test Equipment **2.8.1 Selection.** Measuring and test equipment used to implement the requirements of this standard shall be selected to have range, type and accuracy sufficient to determine conformance to specified requirements.	**Supplement 12S-1 "Supplementary Requirements for Control of Measuring and Test Equipment"** **Paragraph 2** Selection of measuring and test equipment shall be controlled to assure that such items are of proper type, range, accuracy, and tolerance to accomplish the function of determining conformance to specified requirements.	OK

Enclosure 4, Table 6
ANSI N45.2.8-1975 vs NQA-1-1994, Subpart 2.8

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
2.8.2 Calibration and Control. Measuring and test equipment used to determine compliance with specifications, shall be adjusted and calibrated at predetermined intervals, based on equipment stability and use, against certified equipment having known valid relationships to nationally recognized standards.	**Supplement 12S-1 "Supplementary Requirements for Control of Measuring and Test Equipment"** **Paragraph 3.1** Measuring and test equipment shall be calibrated, adjusted and maintained at prescribed intervals or, prior to use, against certified equipment having known valid relationships to nationally recognized standards.	The words "used to determine compliance with specifications" are not in NQA-1 Slightly different wording. Same intent and effect.
If no national standards exist, the basis for calibration shall be documented.	**Supplement 12S-1 "Supplementary Requirements for Control of Measuring and Test Equipment"** **Paragraph 3.1** If no nationally recognized standards exist, the bases for calibration shall be documented.	OK
Records of calibrations shall be maintained and equipment suitably marked so that the calibration status can be determined.	**Supplement 12S-1 "Supplementary Requirements for Control of Measuring and Test Equipment"** **Paragraph 5** Records shall be maintained and equipment shall be suitably marked to indicate calibration status.	Slightly different words, but same intent.
Records of calibration shall be included in inspection and test results where applicable.		These words not in NQA-1
Measures shall be taken to assure proper handling, storage, and care of the measuring and test equipment after calibration in order to maintain the required accuracy of such equipment.	**Supplement 12S-1 "Supplementary Requirements for Control of Measuring and Test Equipment"** **Paragraph 4** Measuring and test equipment shall be properly handled and stored to maintain accuracy.	Slightly different words, but same intent.
When measuring and test equipment is found to be out of calibration, an evaluation shall be made of the validity of previous inspection or test results and the acceptability of mechanical items inspected or tested since the last calibration check.	**Supplement 12S-1 "Supplementary Requirements for Control of Measuring and Test Equipment"** **Paragraph 3.2** When measuring and test equipment is found to be out of calibration, an evaluation shall be made and documented of the validity of previous inspection or test results and the acceptability of items previously inspected or tested.	NQA-1 does not include the word "mechanical" and "since the last calibration check". Slightly different wording. Same intent and effect.
Where necessary to determine the acceptability of items or data, the required original inspections or tests or applicable portions thereof shall be repeated using properly calibrated equipment. In the event that the status of equipment precludes using the originally specified methods, equipment or procedures, alternate inspections or tests agreeable to the	4.1 Planning A plan shall be developed outlining the work to be performed and the work procedures or instructions required to comply with the requirements of the defined work scope. Planning shall include a review of the structure, system or component design/procurement specifications,	The effect of the 4.1 requirements is to establish the necessity and methods for such inspections or tests if they are deemed to be required.

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
responsible organizations may be used.	materials, lists, drawings, construction work plans, and schedules to ensure that fabrication, installation, modification, inspection, testing, etc., activities have been incorporated; that the work can be accomplished as specified; and that time and resources, plus training, are sufficient to accomplish the work in accordance with the specified requirements. Planning shall define the operations to be performed, the systematic sequential progression of operations, and the overall measures to be employed to preserve the quality of the work.	
2.9 Prerequisites The following minimum conditions shall have been met or evidence thereof shall be available as applicable before the requirements set forth in this standard are applied:	**2.2 Prerequisites** The following minimum conditions shall have been met, or evidence thereof shall be available as applicable, before the requirements set forth in Subpart 2.8 are applied.	OK
a. Qualification of individuals, organizations and procedures have been completed in accordance with the requirements of applicable codes and standards.	*(a)* Qualification of individuals, organizations, and procedures have been completed in accordance with the requirements of applicable codes and standards.	OK
b. Systems have been designed and engineered in accordance with applicable codes, standards and specifications.	*(b)* Systems have been designed and engineered in accordance with applicable codes, standards, and specifications.	OK
c. Materials have been selected and equipment has been fabricated and assembled in accordance with the design specifications and the applicable published codes and standards, the conformance to which has been demonstrated by the responsible organization.	(c) Materials have been selected and equipment has been fabricated and assembled in accordance with the design specifications and the applicable published codes and standards, the conformance to which has been demonstrated by the responsible organization.	OK
d. Engineering limitations, as applicable, have been incorporated in the procedures and instructions. These limitations and requirements shall include, as a minimum, installation, testing, and on-site fabrication processes such as cleaning, welding, nondestructive examination and parameters such as pressure, flow, speed, load limits (static and dynamic), travel limits, physical clearances, control and alarm settings, environmental and thermal limits which are included in design specifications, manufacturer's data sheets, instruction manual and design reports.	(d) Engineering limitations, as applicable, have been incorporated in the procedures and instructions. These limitations and requirements shall include, as a minimum, installation, testing, and on-site fabrication processes such as cleaning, welding, nondestructive examination, and parameters such as pressure, flow, speed, load limits (static and dynamic), travel limits, physical clearances, control and alarm settings, and environmental and thermal limits, which are included in design specifications, manufacturer's data sheets, instruction manual, and design reports.	OK
e. To substantiate (b) and (c) above, the following documents relating to the specific stage of installation activity for the item shall be available at the construction site:	(e) To substantiate (b) and (c) above, the following documents relating to the specific stage of installation activity for the item shall be available at the work site:	N45.2.8 uses the term "construction site" whereas NQA-1 uses the term "work site". Same intent and effect.
(1) The latest applicable approved-for-construction drawings.	*(1)* the latest applicable approved-for construction drawings	OK

Enclosure 4, Table 6
ANSI N45.2.8-1975 vs NQA-1-1994, Subpart 2.8

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
(2) Equipment specifications.	*(2)* equipment specifications	OK
(3) Manufacturer's installation instructions.	*(3)* manufacturer's installation instructions	OK
(4) Installation procedures.	(4) installation procedures	OK
(5) Evidence of compliance by manufacturer with purchase requirements, including quality assurance requirements.	*(5)* evidence of compliance by manufacturer with purchase requirements, including quality assurance requirements	OK
(6) Evidence that engineering or design changes are documented and approved prior to installation.	(6) evidence that engineering or design changes are documented and approved prior to installation	OK
(7) Records of inspections and tests during on-site receiving, storage and handling.	(7) records of inspections and tests during on-site receiving, storage, and handling	OK
(8) Release of mechanical items for installation.	*(8)* release of mechanical items for installation	OK
(9) Evidence that nonconformances have been satisfactorily resolved or controlled.	(9) evidence that nonconformances have been satisfactorily resolved or controlled	OK
3. PRE-INSTALLATION VERIFICATION **3.1 General** Prior to the actual installation of mechanical items, there are certain *preliminary inspections, checks and* similar activities that shall be completed to verify that the item and the installation area conform to specified requirements and the necessary resources are available to assure that the quality of the mechanical item will be maintained as the installation proceeds.	**3 PREINSTALLATION VERIFICATION** **3.1 General** Prior to the actual installation of mechanical items, there are certain preliminary inspections, *checks, and similar activities that* shall be completed to verify that the item and the installation area conform to specified requirements, and the necessary resources are available to assure that the quality of the mechanical item will be maintained as the installation proceeds.	OK
The quality requirements and quality assurance actions that are necessary during installation shall be reviewed and planned so that they are understood by responsible individuals.	The quality requirements and quality assurance actions that are necessary during installation shall be reviewed and planned so that they are understood by responsible individuals.	OK
3.2 Identification Checks shall be made to verify that the identity of received mechanical materials and equipment has been maintained and is in accordance with the latest approved-for-construction drawings, equipment lists, specifications and established procedures.	**3.2 Identification** Checks shall be made to verify that the identity of received mechanical materials and equipment has been maintained and is in accordance with the latest approved-for-construction drawings, equipment lists, specifications, and established procedures.	OK
If these checks disclose apparent loss of identification, the identity shall be reaffirmed prior to release for installation.	If these checks disclose apparent loss of identification, the identity shall be reaffirmed prior to release for installation.	OK
Checks shall be made to verify that a control system for maintaining identification of mechanical items throughout installation has been established including provisions for control of substitution or exchange of equipment or materials.	*Checks shall be made to verify that a* control system for maintaining identification of mechanical items through installation has been established, including provisions for control of substitution or exchange of equipment or materials.	OK
The procedures for control of identification shall provide a system of traceability to drawings, specifications or other records when identification or	The procedures for control of identification shall provide a system of traceability to drawings, specifications, or other records when	OK

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
markings must be destroyed, hidden or removed from an item.	identification or markings must be destroyed, hidden, or removed from an item.	
3.3 Processes and Procedures Consistent with the construction activities schedule, inspections or checks shall be performed to verify that processes and procedures are ready when needed for use in the installation of mechanical items.	**3.3 Processes and Procedures** Consistent with the construction activities schedule, inspections, or checks shall be performed to verify that processes and procedures are ready when needed for use in the installation of mechanical items.	OK
These inspections or checks shall include, but not be limited to the following verifications:	These inspections or checks shall include, but not be limited to, the following verifications.	OK
a. Approved procedures, drawings, manuals or other work instructions are provided to the installer at the construction site.	(a) Approved procedures, drawings, manuals, or other work instructions are provided to the installer at the work site.	OK
b. Special instructions and checklists as required are available at the installation area or attached to the item.	*(b)* Special instructions and checklists as required are available at the installation area or attached to the item.	OK
c. Approved procedures and instructions for special processes such as coating, welding, heat treating and nondestructive examination are available at the site.	(c) Approved procedures and instructions for special processes such as coating, welding, heat treating, and nondestructive examination are available at the site.	OK
d. Where applicable, personnel, procedures and instructions shall have been qualified through the preparation of workmanship standards, samples, or mockups that simulate actual job conditions.	*(d)* Where applicable, personnel, procedures, and instructions shall have been qualified through the preparation of workmanship standards, samples, or mockups that simulate actual job conditions.	OK
e. Installation preparations have been completed, including such tasks as removal of packaging, conditioning, cleaning, and preliminary positioning.	(e) Installation preparations have been completed, including such tasks as removal of packaging, conditioning, cleaning, and preliminary positioning.	OK
f. Jigs, fixtures and equipment for special processes, if required, are available at the site and conform to specified requirements.	*(f)* Jigs, fixtures, and equipment for special processes, if required, are available at the site and conform to specified requirements.	OK
g. Equipment for handling and placement of mechanical items is available at the site and is adequate to perform the work in accordance with specified requirements.	*(g)* Equipment for handling and placement of mechanical items is available at the site and is adequate to perform the work in accordance with specified requirements.	OK
h. Warnings and safety notices, appropriate to the activity, are posted.	*(h)* Warnings and safety notices appropriate to the activity are posted.	OK
3.4 Physical Condition Inspections or checks as appropriate shall be performed to verify that mechanical items at the installation are in accordance with the specified requirements and that quality has been maintained.	**3.4 Physical Condition** Inspections or checks, as appropriate, shall be performed to verify that mechanical items at the installation are in accordance with the specified requirements and that quality has been maintained.	OK
These inspections or checks shall include, but not be limited to, the following verifications:	These inspections or checks shall include, but not be limited to, the following verifications.	OK
a. Protective measures and physical integrity during storage have been maintained in conformance with specified requirements.	(a) Protective measures and physical integrity during storage have been maintained in conformance with specified requirements.	OK

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
b. Nonconformances have been satisfactorily dispositioned or controlled.	*(b)* Nonconformances have been satisfactorily dispositioned or controlled.	OK
c. Items have been cleaned in accordance with specified requirements.	(c) Items have been cleaned in accordance with specified requirements.	OK
3.5 Site Conditions Inspections or checks as appropriate shall be performed to verify that conditions of the installation area conform to specified requirements and precautions have been taken to prevent conditions that will adversely affect the quality of the item during installation.	**3.5 Site Conditions** Inspections or checks, as appropriate, shall be performed to verify that conditions of the installation area conform to specified requirements and precautions have been taken to prevent conditions that will adversely affect the quality of the items during installation.	OK
These inspections or checks shall include, but not be limited to, the following to verify that:	These inspections or checks shall include, but not be limited to, verification of the following.	OK
a. Protection from adjacent construction activities being provided including implementation of appropriate exclusion and area cleanness requirements.	(a) Protection from adjacent construction activities is being provided, including implementation of appropriate exclusion and area cleanness requirements.	OK
b. Protection from inclement weather and other ambient conditions adverse to quality is being provided.	*(b)* Protection from inclement weather and other ambient conditions adverse to quality is being provided.	OK
c. Materials that may be deleterious to the mechanical items being installed, are controlled.	(c) Materials that may be deleterious to the mechanical items being installed are controlled.	OK
d. Installation of the mechanical item will not adversely affect the subsequent installation of materials and equipment and that repair or rework on any nonconforming items can be performed satisfactorily.	*(d)* Installation of the mechanical item will not adversely affect the subsequent installation of materials and equipment, and repair or rework on any nonconforming items can be performed satisfactorily.	OK
e. Nonconformances for adjacent items have been dispositioned or controlled.	(e) Nonconformances for adjacent items have been dispositioned or controlled.	OK
f. Adequate permanent or approved temporary supports and mountings have been installed that will properly interface with the mechanical item.	*(f)* Adequate permanent or approved temporary supports and mountings have been installed that will properly interface with the mechanical item.	OK
g. Mating parts such as couplings and flanges are properly positioned and conditioned.	*(g)* Mating parts such as couplings and flanges are properly positioned and conditioned.	OK
h. Servicing or maintenance activity related to installation has been performed.	(h) Servicing or maintenance activity related to installation has been performed.	OK
4. CONTROL DURING INSTALLATION PROCESS **4.1 General** Checking, inspection, examination or testing activities shall be performed during the installation of mechanical items to assure that the required quality is being obtained in accordance with prescribed procedures.	**4 CONTROL DURING INSTALLATION PROCESS** **4.1 General** Checking, inspection, and examination of testing activities shall be performed during the installation of mechanical items to assure that the required quality is being obtained in accordance with prescribed procedures.	NQA-1 uses "Checking, inspection, and examination **of** testing..." This is considered to be a typographical error.

Enclosure 4, Table 6
ANSI N45.2.8-1975 vs NQA-1-1994, Subpart 2.8

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
These activities shall be performed in a systematic manner to assure surveillance thoughout the installation process.	These activities shall be performed in a systematic manner to assure surveillance throughout the installation process.	OK
A procedure shall be provided for the coordination and sequencing of these activities at established inspection points in successive stages of installation.	A procedure shall be provided for the coordination and sequencing of these activities at established inspection points in successive stages of installation.	OK
A method shall be implemented to assure that engineering and design changes are documented and controlled during installation.	A method shall be implemented to assure that engineering and design changes during installation are documented and controlled.	OK
4.2 Process and Procedure Control	**4.2 Process and Procedures Control**	OK
Checks shall be made to verify that a system of controls has been established and is being maintained at the construction site to assure the following:	Checks shall be made to verify that a system of controls has been established and is being maintained at the construction site to assure the following.	OK
a. The applicable revision of approved procedures, drawings and instructions are being followed.	(a) The applicable revision of approved procedures, drawings, and instructions is being followed.	OK
b. Qualified and approved processes, materials, tools and other equipment are being used by qualified personnel.	*(b)* Qualified and approved processes, materials, tools, and other equipment are being used by qualified personnel.	OK
c. The status of installation, inspections, examinations or tests is clearly indicated or identified in inspection records.	(c) The status of installation, inspections, examinations, or tests is clearly indicated or identified in inspection reports.	OK
d. The installation, inspection and testing sequence is being maintained.	*(d)* The installation, inspection, and testing sequences are being maintained.	OK
e. Identification, appropriate segregation, and disposition of nonconforming items are being controlled.	(e) Identification, appropriate segregation, and disposition of nonconforming items are being maintained.	N45.2.8 uses term "are being controlled" whereas NQA-1 uses term "are being maintained". Differently worded. Same intent and effect.
f. "As-built" information is being processed.	*(f)* As-built information is being processed.	OK
g. Inspection and test reports are current, accurate and complete.	*(g)* Inspection and test reports are current, accurate, and complete.	OK
4.3 Examination Nondestructive examinations, when required, shall be performed to approved applicable procedures. Examples of these examinations are liquid penetrant, magnetic particle, ultrasonic, eddy current and radiography.	**Supplement 9S-1 "Supplementary Requirements for Control of Processes"** **Paragraph 3** Each special process shall be performed in accordance with appropriate instructions which include or reference procedure, personnel, and equipment qualification requirements.	N45.2.8 provides examples of nondestructive examinations. Same intent and effect.
4.4 Inspection Inspections of the work areas and the work in progress shall be performed to verify that mechanical items are being located, installed, assembled or connected in compliance with the latest	**4.3 Inspection** Inspections of the work areas and the work in progress shall be performed to verify that mechanical items are being located, installed, assembled, or connected in compliance with the	OK

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
approved-for-construction drawings, manufacturers' instructions, codes, installation instructions and procedures.	latest approved-for-construction drawings, manufacturer's instructions, and procedures.	
Inspections performed shall include as appropriate, but not be limited to, the following:	Inspections performed shall include as appropriate, but not be limited to, the following:	OK
a. Identification.	*(a)* identification	OK
b. Location and orientation of components.	*(b)* location and orientation of components	OK
c. Leveling and alignment.	(c) leveling and alignment	OK
d. Clearances and tolerances.	*(d)* clearances and tolerances	OK
e. Tightness of connections and fastenings.	(e) tightness of connections and fastenings	OK
f. Fluid levels and pressures.	*(f)* fluid levels and pressures	OK
g. Absence of leakage.	*(g)* absence of leakage	OK
h. Physical integrity.	*(h)* physical integrity	OK
i. Cleanness.	*(i)* cleanness	OK
j. Welding operations including materials and process controls, adequate purging, and the removal of purge dams on completion.	*(j)* welding operations, including materials and process controls, adequate purging, and the removal of purge dams on completion	OK
k. Adequacy of protective measures to assure that the item will not be damaged during installation.	*(k)* adequacy of protective measures to assure that the item will not be damaged during installation	OK
l. Adequacy of housekeeping, barriers and protective equipment to assure that items will not be damaged or contaminated as a result of adjacent construction activities.	*(l)* adequacy of housekeeping, barriers, and protective equipment to assure that items will not be damaged or contaminated as a result of adjacent construction activities	OK
4.5 Installation Checks Checks shall be performed to verify that mechanical items have been correctly installed and will function properly so that the initial starting of items and preoperational testing can proceed with a minimum amount of problems and delays.	**4.4 Installation Checks** Checks shall be performed to verify that mechanical items have been correctly installed and will function properly so that the initial starting of items and preoperational testing can proceed with a minimum amount of problems and delays.	OK
If construction or associated activity affects the results of these checks, the checks shall be repeated if necessary to assure that the quality has not been adversely affected.	If construction or associated activity affects the results of these checks, the checks shall be repeated, if necessary, to assure that the quality has not been adversely affected.	OK
These activities shall include as appropriate, but not be limited to, the following:	These activities shall include as appropriate, but not be limited to, the following.	OK
a. Checkout procedures are prepared and approved to verify correctness of installation and ability to function.	(a) Checkout procedures are prepared and approved to verify correctness of installation and ability to function.	OK
b. Proper greasing or lubrication has been completed.	*(b)* Proper greasing or lubrication has been completed.	OK
c. Lubricating and cooling water systems are in service.	(c) Lubricating and cooling water systems are in service.	OK
d. Protection strainers are installed where necessary.	*(d)* Protection strainers are installed where necessary.	OK
e. Rotation of prime movers is correct.	(e) Rotation of prime movers is correct.	OK
f. Electrical circuits, controls and relay settings are correct.	*(f)* Electrical circuits, controls, and relay settings are correct.	OK
g. Phasing of electrical busses is correct.	*(g)* Phasing of electrical buses is correct.	OK
h. Instrumentation is calibrated and in	*(h)* Instrumentation is	OK

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
service as required.	calibrated and in service as required.	
i. Item is correctly valved and isolated.	*(i)* Item is correctly valved and isolated.	OK
j. Casings, reservoirs, etc. are primed, vented and filled.	*(j)* Casings, reservoirs, etc., are primed, vented, and filled.	OK
k. Proper communications are established for control.	*(k)* Proper communications are established for control.	OK
l. Tags are issued, where appropriate, for isolation and control.	*(l)* Tags are issued, where appropriate, for isolation and control.	OK
m. Piping system alignment is correct.	*(m)* Piping system alignment is correct.	OK
n. Pipe hanger placement is correct and hangers will function properly.	*(n)* Pipe hanger placement is correct and hangers will function properly.	OK
o. Seismic anchors and restraints are properly installed.	(o) Seismic anchors and restraints are properly installed.	OK
p. Valve glands and packing are installed.	(p) Valve glands and packing are installed.	OK
q. Pneumatic lines have been blown.	(q) Pneumatic lines have been blown.	OK
r. Valve stroking, actuation and settings are proper.	*(r)* Valve stroking, actuation, and settings are proper.	OK
s. Pump seals and packing are properly installed.	*(s)* Pump seals and packing are properly installed.	OK
t. Limit switches, interlocks and stops are properly adjusted and set.	(t) Limit switches, interlocks, and stops are properly adjusted and set.	OK
4.5.1 Cleaning. Installed systems and components shall be cleaned, flushed and conditioned according to the requirements of ANSI N45.2.1. Special attention shall be given to the following requirements:	**4.4.1 Cleaning.** Installed systems and components shall be cleaned, flushed, and conditioned according to applicable requirements. Special attention shall be given to the following requirements.	N45.2.8 states according to the requirements of ANSI N45.2.1 whereas NQA-1 states according to applicable requirements. See 2.4 above.
a. Chemical Conditioning. Procedures shall be prepared including the scope, acceptance criteria, sequence, temperatures, soak periods and neutralizing solutions to be used.	***(a) Chemical Conditioning.*** Procedures shall be prepared including the scope, acceptance criteria, sequence, temperatures, soak periods, and neutralizing solutions to be used.	OK
Checks shall be made to verify that the proper chemicals at the designated strength and temperature are being used in the conditioning operations	Checks shall be made to verify that the proper chemicals at the designated strength and temperature are being used in the conditioning operations.	OK
Other operations shall be performed as specified in Paragraph 4.5.1.c.	Other operations shall be performed as specified in (c) below.	OK
b. Flushing. Procedures shall be prepared including routes, boundaries, velocities and acceptance criteria, restoration, and layup for high integrity systems where appropriate.	***(b) Flushing.*** Procedures shall be prepared including routes, boundaries, velocities and acceptance criteria, restoration, and layup for high integrity systems, where appropriate.	OK
Checks shall be made to verify that mechanical items are being flushed in accordance with specified requirements so that contaminants or flow velocities will not adversely affect subsequent operations.	Checks shall be made to verify that mechanical items are being flushed in accordance with specified requirements so that contaminants or flow velocities will not adversely affect subsequent operations.	OK
Other operations shall be performed as specified in Paragraph 4.5.1 .c.	Other operations shall be performed as specified in (c) below.	OK
c. Process Controls. Checks shall be performed to verify that controls are functioning for the following:	***(c) Process Controls.*** Checks shall be performed to verify that controls are functioning for the following:	OK
(1) Removal and installation of parts or	*(1)* removal and installation of parts	OK

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
components such as metering devices, orifice plates and valve internals that are removed from the system to facilitate flushing.	or components such as metering devices, orifice plates, and valve internals that are removed from the system to facilitate flushing;	
(2) Installation and removal of temporary strainers, blind flanges, and piping.	(2) installation and removal of temporary strainers, blind flanges, and piping;	OK
(3) Isolation of sensitive instrumentation.	*(3)* isolation of sensitive instrumentation;	OK
(4) Water and chemical quality.	(4) water and chemical quality;	OK
(5) Acceptance data, specimens, or progressive samples if required.	(5) acceptance data, specimens, or progressive samples, if required.	OK
Where appropriate for disassembly and reassembly of components, procedures or instructions shall be prepared or manufacturer's technical manuals shall be used to assure adherence to match marks, protection of seats and proper reassembly and to preclude damage to the component.	Where appropriate for disassembly and reassembly of components, procedures or instructions shall be prepared or manufacturer's technical manuals shall be used to assure adherence to match marks, protection of seats, and proper reassembly and to preclude damage to the component.	OK
4.5.2 Pressure Testing. Checks shall be made to verify that mechanical items are being pressure tested in accordance with specified requirements to assure that the strength and integrity of the installed systems or portions thereof conform to specified requirements.	**4.4.2 Pressure Testing.** Checks shall be made to verify that mechanical items are being pressure tested in accordance with specified requirements to assure that the strength and integrity of the installed systems or portions thereof conform to specified requirements.	OK
The purpose of the test, scope, test boundary, duration for inspection, acceptance criteria, restoration, and layup shall be clearly established and documented.	The purpose of the test, scope, test boundary, duration for inspection, acceptance criteria, restoration, and layup shall be clearly established and documented.	OK
Checks shall include, but not be limited to, the following:	Checks shall include, but not be limited to, the following.	OK
a. Appropriate pressures, temperatures, water chemistry, and pressure test cycles are established.	(a) Appropriate pressures, temperatures, water chemistry, and pressure test cycles are established.	OK
b. Sufficient time at test pressure is specified to determine acceptance	*(b)* Sufficient time at test pressure is specified to determine acceptance.	OK
c. Provisions are available to protect and isolate instrumentation during hydrostatic testing.	(c) Provisions are available to protect and isolate instrumentation during hydrostatic testing.	OK
d. Items external to test boundary are protected to prevent inadvertent overpressurization.	*(d)* Items external to test boundary are protected to prevent inadvertent overpressurization.	OK
e. Relief devices are controlled to prevent system overpressurization.	(e) Relief devices are controlled to prevent system overpressurization.	OK
f. Gagging and ungagging of relief valves.	*(f)* Gagging and ungagging of relief valves.	OK
g. Piping and equipment supports have hydrostatic pins installed where applicable for testing and removed upon completion of testing.	*(g)* Piping and equipment supports have hydrostatic pins installed where applicable for testing and are to be removed upon completion of testing.	OK
	(h) Evidence of calibration of test gages.	These words are not included in N45.2.8
4.6 Care of Items Items on which inspection and testing activities are being performed shall be protected from personnel traffic, weather, and adjacent construction activities such as sandblasting, acid cleaning, welding, jack hammering,	**4.5 Care of Items** Items on which inspection and testing activities are being performed shall be protected from personnel traffic, weather, and adjacent construction activities such as sandblasting, acid cleaning, welding, jack hammering,	OK

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
chipping, burning and stress relieving that would adversely affect the quality of the item or test results.	chipping, burning, and stress relieving, which would adversely affect the quality of the item or test results.	
Such protection shall be provided through good cleanliness and housekeeping practices, temporary packaging, erection of barriers, protective covers, and walkways as required in accordance with Subsection 2.6.	Such protection shall be provided through good cleanliness and housekeeping practices, temporary packaging, erection of barriers, protective covers, and walkways, as required.	OK
Temporary use of equipment or facilities to which this standard applies that are to become part of the completed project may be desirable.	Temporary use of equipment or facilities to which this Part applies that are to become part of the completed project may be desirable.	OK
Authorization for such usage shall be as provided for in the contract or by written approval from the responsible organization.	Authorization for such usage shall be as provided for in the contract or by written approval from the responsible organization.	OK
Such temporary use shall not subject the equipment or systems to conditions for which they were not designed.	Such temporary use shall not subject the equipment or systems to conditions for which they were not designed.	OK
The temporary use authorization shall include:	The temporary use authorization shall include:	OK
(1)conditions of use or operation;	*(a)* conditions of use or operation;	OK
(2) maintenance requirements; and	*(b)* maintenance requirements; and	OK
(3) inspections and tests as required to maintain operability and quality during period of temporary use of the item.	(c) inspections and tests as required to maintain operability and quality during the period of temporary use of item.	OK
When temporary use is completed, conditions of temporary use shall be evaluated to verify that the permanent plant equipment continues to satisfy the specified requirements.	When temporary use is completed, conditions of temporary use shall be evaluated to verify that the permanent plant equipment continues to satisfy the most specified requirements.	NQA-1 adds the word "most".
5. INSTALLED SYSTEMS INSPECTION AND TESTS **5.2 General** Following the installation of mechanical items, the checking, inspection, and testing activities shall be performed to verify that the completed systems are in conformance with specified requirements.	**5 INSTALLED SYSTEMS INSPECTION AND TESTS** **5.1 General** Following the installation of mechanical items, the checking inspection and testing activities shall be performed to verify that the completed systems are in conformance with specified requirements.	OK
This is a final verification that the requirements defined by licensing commitments, drawings, specifications and other contract documents are reflected in the completed installation.	This is a final verification that the requirements defined by licensing commitments, drawings, specifications, and other contract documents are reflected in the completed installation.	OK
It is also a time to verify that field modifications and other changes made and controlled during installation activities have been incorporated in the "as-built" documents.	It is also a time to verify that field modifications and other changes made and controlled during installation activities have been incorporated in the as-built documents.	OK
Controls shall be provided for the	Controls shall be provided for the	OK

Enclosure 4, Table 6
ANSI N45.2.8-1975 vs NQA-1-1994, Subpart 2.8

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
identification, documentation, and resolution of nonconformances disclosed by inspections or tests.	identification, documentation, and resolution of nonconformances disclosed by inspections or tests.	
Tests shall be conducted on completed plant systems.	Tests shall be conducted on completed plant systems.	OK
Test procedures shall identify prerequisites for system testing including required completed construction activities.	Test procedures shall identify prerequisites for system testing, including required completed construction activities.	OK
The test procedure shall identify and describe any temporary or simulated condition or equipment.	The test procedures shall identify and describe any temporary or simulated condition or equipment.	OK
If not previously planned, a documented notice shall be prepared and issued with approval of the responsible organization stating the substitutions that existed for the test.	If not previously planned, a documented notice shall be prepared and issued with approval of the responsible organization stating the substitutions that existed for the test.	OK
Written verification shall also be provided that temporary installations have been satisfactorily replaced by the permanent installations.	Written verification shall also be provided that temporary installations have been satisfactorily replaced by permanent installations.	OK
Checks and inspections shall be performed to verify the operational readiness and completeness of components and systems. These systems or partial systems shall be identified, tagged and released for operational testing.	Checks and inspections shall be performed to verify the operational readiness and completeness of components and systems. These systems or partial systems shall be identified, tagged, and released for operational testing.	OK
These checks and inspections shall be performed to verify the following as a minimum:	These checks and inspections shall be performed to verify the following, as a minimum.	OK
a. Equipment and materials have not sustained external physical damage.	(a) Equipment and materials have not sustained external physical damage.	OK
b. The installation has been made in accordance with specified requirements.	*(b)* The installation has been made in accordance with specified requirements.	OK
c. All nonconforming items have been satisfactorily dispositioned.	*(c)* All nonconforming items have been satisfactorily dispositioned.	OK
d. Internal and external restrictions and obstructions to flow and full travel have been removed.	*(d)* Internal and external restrictions and obstructions to flow and full travel have been removed.	OK
e. Supports and restraints are properly installed.	(e) Supports and restraints are properly installed.	OK
f. Interfacing connections with adjacent systems are compatible.	*(f)* Interfacing connections with adjacent systems are compatible.	OK
g. Original materials and component identification has been preserved with provisions for traceability throughout the installed systems.	*(g)* Original materials and component identification have been preserved with provisions for traceability throughout the installed systems.	OK
h. Safety features such as interlocks, cable separation, guards, warning devices, and lockouts have been installed, are being used and comply with applicable codes and regulations.	*(h)* Safety features such as interlocks, cable separations, guards, warning devices, and lockouts have been installed, are being used, and comply with applicable codes and regulations.	OK
i. Temporary connections such as jumpers and bypass lines and temporary trip points of control equipment are identified and documented so that their final condition can be verified.	*(i)* Temporary connections, such as jumpers and bypass lines, and temporary trip points of control equipment are identified and documented so that their final condition can be verified.	OK
j. System water chemistry is appropriate for operational testing.	*(j)* System water chemistry is appropriate for operational testing.	OK

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
k. External surface chemistry requirements have been maintained.	*(k)* External surface chemistry requirements have been maintained.	OK
l. Permits and authorizations have been obtained.	*(l)* Permits and authorizations have been obtained.	OK
5.3 Preoperational Testing This testing involves the operation of all items in a system, partial systems or systems to assure that operation is in accordance with the design criteria and functional requirements. The testing shall include, but not be limited to, the following:	**5.2 Preoperational Testing** This testing involves the operation of all items in a system(s) or partial system(s) to assure that operation is in accordance with the design criteria and functional requirements. The testing shall include, but not be limited to, the following:	OK
a. Systems integrity.	(a) systems integrity;	OK
b. In-line instrument installation is consistent with specified flow directions.	*(b)* in-line instrument installation is consistent with specified flow directions;	OK
c. Sensing lines are phased correctly to in-line elements and sensors.	(c) sensing lines are phased correctly to in-line elements and sensors;	OK
d. Service requirements for initial operation such as flow alignment, limiting flow orificing and relief devices have been performed.	*(d)* service requirements for initial operation such as flow alignments, limiting flow orificing, and relief devices have been performed;	OK
e. Operation of controls, valves, dampers, operators, and load limiting devices.	(e) operation of controls, valves, dampers, operators, and load limiting devices;	OK
f. Rotating equipment (motors, pumps, blowers)— rotation, speed, vibration, noise, and no-load operation.	*(f)* rotating equipment (motors, pumps, blowers), rotation, speed, vibration, noise, and no-load operation;	OK
g. Handling equipment—load tests of cranes, hoists, conveyors, hooks, and handling adaptors, and accessories.	*(g)* handling equipment (load tests of cranes, hoists, conveyors, hooks, handling adapters, and accessories);	OK
h. Containment systems.	*(h)* containment systems;	OK
i. Air handling systems.	*(i)* air handling systems;	OK
j. Fuel storage and handling systems.	*(j)* fuel storage and handling systems;	OK
k. Reactor components handling systems.	*(k)* reactor component handling systems;	OK
l. Instrument air systems.	*(l)* instrument air systems;	OK
m. Fluid service systems.	*(m)* fluid service systems;	OK
n. Waste effluent systems.	*(n)* waste effluent systems;	OK
o. Auxiliary building systems.	*(0)* auxiliary building systems.	OK
Where mechanical equipment and systems interface with, and their operation must coordinate with, non-mechanical equipment or systems, the test performed shall include verifying the compatibility of interfacing equipment and functions.	Where mechanical equipment and systems interface with, and their operation must coordinate with, non-mechanical equipment or systems, the test performed shall include verifying the compatibility of interfacing equipment and functions.	OK
For additional information on inspections, tests and procedures, see Section 6 of ANSI N18.7.		Guidance only. Wording does not establish requirements.
5.4 Cold Functional Tests These tests follow preoperational testing of individual systems including reactor coolant systems.	**5.3 Cold Functional Tests** These tests follow preoperational testing of individual systems, including reactor coolant systems.	OK
This testing shall be performed to obtain operational data of equipment with maximum allowable simultaneous operation of interfacing systems and equipment and final verification of	This testing shall be performed to obtain operational data of equipment and maximum allowable simultaneous operation of interfacing systems and equipment, the final	OK

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
functional performance of these systems.	verification of functional performance of these systems.	
5.3.1 Reactor Coolant System Hydrostatic Tests. As applicable to the reactor system type, hydrostatic tests to verify conformance to specified requirements when performed on the reactor coolant system, shall include all or parts of connected systems which cannot be isolated from the test pressure.	**5.3.1 Reactor Coolant System Hydrostatic Tests.** As applicable to reactor system type, hydrostatic tests to verify conformance to specified requirements, when performed on the reactor coolant system, shall include all or parts of connected systems which cannot be isolated from the test pressure.	OK
The applicable test requirements are contained in Section III of the Code.	The applicable test requirements are contained in Section III of the ASME Boiler and Pressure Vessel Code.	OK
5.3.2 Functional and Flow Testing. The required individual systems shall be tested to demonstrate cold functional operability of individual components, subsystems and systems, and to demonstrate compatibility with other systems.	**5.3.2 Functional and Flow Testing.** The required individual systems shall be tested to demonstrate cold functional operability of individual components, subsystems, and systems, and to demonstrate compatibility with other systems.	OK
These tests, where appropriate, shall demonstrate the following:	These tests, where appropriate, shall demonstrate the following:	OK
a. System pressure drop.	*(a)* system pressure drop	OK
b. Flow rate.	*(b)* flow rate	OK
c. Controls and throttling device settings.	(c) controls and throttling device settings	OK
d. Function of interlocks, alarms and automatic features.	*(d)* function of interlocks, alarms, and automatic features	OK
e. Instrument calibration.	(e) instrument calibration	OK
f. Setting of meter biases.	*(f)* setting of meter biases	OK
g. Systems stability.	*(g)* system stability	OK
h. Adequacy of pipe and equipment support settings.	*(h)* adequacy of pipe and equipment support settings	OK
i. Heat runs on rotating equipment.	*(i)* heat runs on rotating equipment	OK
j. Adequacy of ventilation, lubrication and cooling systems under sustained operating conditions.	*(j)* adequacy of ventilation, lubrication, and cooling systems under sustained operating conditions	OK
k. Ability to meet water chemistry requirements.	*(k)* ability to meet water chemistry requirements	OK
5.5 Hot Functional Tests These tests are not applicable to BWR and HTGR nuclear plants because these plants use nuclear heat to produce the system temperatures.	**5.4 Hot Functional Tests** These tests are not applicable to BWR and HTGR nuclear plants because these plants use nuclear heat to produce the system temperatures.	OK
Hot functional tests for PWR plants follow cold functional tests and simulate plant operating conditions at elevated temperatures and pressures.	Hot functional tests for PWR plants follow cold function tests and simulate plant operating conditions at elevated temperatures and pressures.	OK
All auxiliary and support systems exclusive of those required for pre-criticality resting must be available for these tests.	All auxiliary and support systems exclusive of those required for precriticality testing must be available for these tests.	OK
If any of these systems are not available, the responsible organization shall specifically authorize exclusion of these systems or subsystems from testing and document those exceptions.	If any of these systems is not available, the responsible organization shall specifically authorize exclusion of these systems from testing and document those exceptions.	OK
These systems shall include the	These systems shall include the	OK

Enclosure 4, Table 6
ANSI N45.2.8-1975 vs NQA-1-1994, Subpart 2.8

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
following as a minimum:	following as a minimum:	
a. System pressure drop.	*(a)* system pressure drop	OK
b. Flow rate.	*(b)* flow rate	OK
c. Controls and throttling device settings.	(c) controls and throttling device settings	OK
d. Function of interlocks, alarms and automatic features.	*(d)* function of interlocks, alarms, and automatic features	OK
e. Instrument calibration.	(e) instrument calibration	OK
f. Setting of meter biases.	*(f)* setting of meter biases	OK
g. Systems stability.	*(g)* system stability	OK
h. Adequacy of pipe and equipment support settings.	*(h)* adequacy of pipe and equipment support settings	OK
i. Heat runs on rotating equipment.	*(i) heat runs on rotating equipment*	OK
j. Verification of heat exchanger performance.	*(j)* verification of heat exchanger performance	OK
k. Verification of boron control system performance.	*(k)* verification of boron control system performance	OK
l. Thermal insulation effectiveness.	*(l)* thermal insulation effectiveness	OK
m. Set points of temperature, pressure and level devices.	*(m)* set points of temperature, pressure, and level devices	OK
n. System heatup tests.	*(n)* system heatup tests	OK
o. System cooldown tests.	(0) system cooldown tests	OK
p. Hot flow tests.	(p) hot flow tests	OK
q. Setting protective devices.	(q) setting protective devices	OK
r. Hot clearances.	*(r)* hot clearances	OK
s. Vibration measurement of major equipment and piping, as applicable.	(s) vibration measurements of major equipment and piping, as applicable	OK
6. DATA ANALYSIS AND EVALUATION Procedures shall be established for processing inspection and test data and their analysis, evaluation, and final acceptance.	**6 DATA ANALYSIS AND EVALUATION** Procedures shall be established for processing inspection and test data and their analysis, evaluation, and final acceptance.	OK
These procedures shall identify individuals or organizations responsible for the acquisition and reduction of inspection and test data and evaluation against acceptance criteria, operating limits, and performance standards.	These procedures shall identify individuals or organizations responsible for the acquisitions and reduction of inspection and test data, and evaluation against acceptance criteria, operating limits, and performance standards.	OK
The data processing procedure should provide for preliminary evaluation to determine the validity of the inspection and test results, and the appropriateness of continuing the inspection or test.	The data processing procedure shall provide for preliminary evaluation to determine the validity of the inspection and test results and the appropriateness of continuing the inspection or test.	OK
The data shall be analyzed and evaluated to verify completeness of results, achievement of inspection and test objectives, and operational proficiency of equipment and systems; to identify additional inspection or test requirements or both; and to identify necessary changes to the installation inspection or test procedures.	The data shall be analyzed and evaluated to verify completeness of results, achievement of inspection and test objectives, and operational proficiency of equipment and systems; to identify additional inspection or test requirements or both; and to identify necessary changes to the installation inspection or test procedures.	OK
Inspection and test results supported by the inspection and test data, together with a report of data analysis and evaluation, shall be provides as *specified in Section 7.*	Inspection and test results supported by the inspection and test data, together with a report of data analysis and evaluation, shall be provided as *specified in Section 7.*	OK
7. RECORDS	**7 RECORDS**	NQA-1 deleted the word "completed"

ANSI N45.2.8 - 1975	NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
		before procedures. No effect – a record is defined as being properly completed and authenticated.
Record copies of completed procedures; reports; required qualification records; test equipment calibration records; test deviation or exception records; and inspection, examination and check records shall be prepared.	Record copies of procedures, reports, required qualification records, test equipment calibration records, test deviation or exception records, and inspection, examination, and check records shall be prepared.	
These shall be placed with other project records as required by code, standard, specification or project procedures.	These records shall be retained with other project records as required by code, standard, specification, or project procedures.	N45.2.8 uses word "placed" whereas NQA-1 uses word "retained". Same intent and effect.
Collection, storage and maintenance of quality assurance records shall be in accordance with ANSI N45.9.		Guidance only. Wording does not establish requirements. QAPP 4.17 "Quality Assurance Records" establishes requirements.
8. REVISION OF AMERICAN NATIONAL STANDARDS REFERRED TO IN THIS DOCUMENT When the following standards referred to in this document are superseded by a revision approved by the American National Standards Institute, the revision is not mandatory until it has been incorporated as a part of this standard. Revisions of the referenced standards, and revisions to this standard issued after the date of a specific contract invoking this standard may be used by mutual consent of the purchaser and the supplier. N18.7-1972 Administrative Controls for Nuclear Power Plants *N45* .2-1971 Quality Assurance Program Requirements for Nuclear Power Plants *N45.2.1 -1973* Cleaning of Fluid Systems and Associated Components During the Construction Phase of Nuclear Power Plants N45.2.2-1972 Packaging, Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants (During the Construction Phase) N45.2.3-1973 Housekeeping During the Construction Phase of Nuclear Power Plants N45.2-6-1973 Qualifications of		NQA-1 includes applicable provisions of these standards. No corresponding provision in NQA-1 for addressing revisions is included or required.

Enclosure 4, Table 6
ANSI N45.2.8-1975 vs NQA-1-1994, Subpart 2.8

ANSI N45.2.8 - 1975		NQA-1 (1994) Subpart 2.8 (except where noted)	Comments (NOTE: OK signifies identical or nearly identical wording)
	Inspection, Examination and Testing Personnel for the Construction Phase of Nuclear Power Plants		
N45.2.9-1974	Requirements for Collection, Storage and Maintenance of Quality Assurance Records for Nuclear Power Plants		
N45.2.10-1973	Quality Assurance Terms and Definitions		