

ATTACHMENT 3

VIRGINIA ELECTRIC AND POWER COMPANY
DOMINION NUCLEAR CONNECTICUT, INC.
SURRY POWER STATION UNITS 1 AND 2 AND ISFSI
NORTH ANNA POWER STATION UNITS 1 AND 2 AND ISFSI
MILLSTONE POWER STATION UNITS 1, 2 AND 3 AND ISFSI
ASSOCIATED RADIOACTIVE MATERIAL PACKAGES
NUCLEAR FACILITY QUALITY ASSURANCE PROGRAM DESCRIPTION
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COMPARATIVE ANALYSIS OF CURRENT N45.2 SERIES QA STANDARDS
TO NQA-1-1994 STANDARDS

429 PAGES FOLLOW

THE FOLLOWING TABLES PROVIDE COMPARISON OF THE NQA-1-1994 QUALITY ASSURANCE STANDARDS TO THE N45.2 AND RELATED QA STANDARDS THAT FORM THE BASIS OF THE CURRENT QA PROGRAMS FOR DOMINION'S NUCLEAR FACILITIES.

AS MUCH AS PRACTICAL, THE TABLES ARE ARRANGED IN THE ORDER OF THE TEXT FROM THE NQA-1 STANDARDS IN THE CENTER COLUMN WITH THE APPROPRIATE CURRENT STANDARD'S REFERENCE IN THE LEFT COLUMN. COMMENTS ON DIFFERENCES ARE CONTAINED IN THE RIGHT HAND COLUMN. NQA-1 STANDARDS THAT DID NOT HAVE A CORRESPONDING CURRENT STANDARD ARE NOT INCLUDED IN THE COMPARISON TABLES (I.E. SUBPARTS 2.7, 2.18, 2.20).

BOOKMARKS ARE INCLUDED TO ALLOW FOR NAVIGATION TO SPECIFIC SECTIONS.

<p align="center">CRITERION 1 ANSI N45.2-1977/N18.7-1976</p>	<p align="center">BASIC REQUIREMENT 1 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>N45.2 § 2 ¶ 2 – The program shall define the organizational structure within which the Quality Assurance Program is to be planned and implemented and shall clearly delineate the responsibility and authority of the various personnel and organizations involved.</p> <p>N45.2 § 3 ¶ 1 - The organizational structure, functional responsibilities, levels of authority, and lines of internal and external communication for management, direction and execution of the Quality Assurance Program shall be documented.</p> <p>N45.2 § 1.2 ¶ 1 – This standard is intended to apply to the facility owners, major contractors, such as the nuclear steam supply system designer or supplier, process equipment designer or supplier, the architect-engineer or facility designer, the constructor, and other organizations participating in activities affecting quality.</p> <p>N18.7§ 3.2 ¶ 1 Assignment of Authority and Responsibility. It is essential that all members of the organization involved in operation of nuclear power plants, including those at the highest management levels, recognize the necessity that the plants be operated under a well formulated and detailed administrative controls and quality assurance program to assure safety and efficiency. Lines of authority, responsibility and communication shall be established from the highest management level through intermediate levels to and including the onsite operating organization (including those offsite organizational units assigned responsibility for procurement, design and construction, quality assurance, and technical support activities). These relationships shall be documented and updated, as appropriate, in the form of organizational charts, functional descriptions of departmental responsibilities and relationships and job descriptions for key personnel positions or in equivalent forms of documentation.</p> <p>N18.7§ 3.2 ¶ 2 The owner organization shall specify in writing the authority and responsibility assigned individuals and organizations involved in establishing, executing and measuring the overall effectiveness of the administrative controls and quality assurance program required by this Standard.</p>	<p>The organizational structure, functional responsibilities, levels of authority, and lines of communication for activities affecting quality shall be documented.</p>	<p>Similar requirement, but NQA-1 addresses this in the Introduction to Part I, § 2 Applicability.</p> <p>Overall Note: Aspects from N45.2 and N18.7 dealing with qualification and training are addressed with Criterion 2, and Reg. Guide 1.8 regarding selection, training and qualification of personnel.</p>
<p>N 45.2 §3 ¶ 2 – The authority and responsibility of</p>	<p>Persons or organizations responsible for assuring that an</p>	<p>Similar requirement.</p>

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<p>persons and organization performing activities shall be clearly established. Persons and organizations performing quality assurance functions shall have sufficient authority, access to work areas, and organizational freedom to:</p> <p>(1) identify quality problems; (2) initiate, recommend, or provide solutions to quality problems through designated channels; (3) verify implementation of solutions; and (4) control further processing, delivery, installation, of a nonconforming item, deficiency, or unsatisfactory condition until proper dispositioning has occurred.</p> <p>N18.7 § 3.2 ¶ 4 Persons or organizations performing functions of assuring that the administrative controls and quality assurance program is established and implemented or of assuring that an activity has been correctly performed shall have sufficient authority and organizational freedom to: identify quality problems; initiate, recommend or provide solutions, through designated channels; and verify implementation of solutions.</p>	<p>appropriate quality assurance program has been established and verifying that activities affecting quality have been correctly performed shall have sufficient authority, access to work areas, and organizational freedom to:</p> <p>(a) identify quality problems; (b) initiate, recommend, or provide solutions to quality problems through designated channels; (c) verify implementation of solutions; and (d) assure that further processing, delivery, installation, or use is controlled until proper disposition of a nonconformance, deficiency, or unsatisfactory condition has occurred.</p>	
<p>N45.2 § 3 ¶ 3 The person or organization responsible for defining and measuring the overall effectiveness of the Quality Assurance Program shall be designated, shall be sufficiently independent from the pressures of production and shall have direct access to responsible management at a level where appropriate action can be required, and shall report regularly on the effectiveness of the program.</p> <p>N18.7 § 3.2 ¶ 3 The persons or organizations responsible for defining and measuring the overall effectiveness of the program shall be designated, shall be sufficiently independent from cost and scheduling considerations when opposed to safety considerations, shall have direct access to responsible management at a level where appropriate action can be accomplished, and shall report regularly on the effectiveness of the program to the plant manager and the cognizant offsite management.</p>	<p>Such persons or organizations shall have direct access to responsible management at a level where appropriate action can be effected. Such persons or organizations shall report to a management level such that required authority and organizational freedom are provided, including sufficient independence from cost and schedule considerations.</p>	<p>Similar requirement.</p>
	<p>SUPPLEMENT 1S-1 Supplementary Requirements for Organization</p>	
	<p>1 GENERAL</p>	
	<p>This Supplement provides amplified requirements for organization.</p>	

CRITERION 1 ANSI N45.2-1977/N18.7-1976	BASIC REQUIREMENT 1 NQA-1 1994	COMMENTS
	It supplements the requirements of Basic Requirement 1 of this Part (Part I) and shall be used in conjunction with that Basic Requirement when and to the extent specified by the organization invoking this Part (Part I).	
	2 RESPONSIBILITY	
	2.1 Purpose	
<p>N45.2 § 3 ¶ 4 The organizational structure and the functional responsibility assignments shall be such that</p> <p>N18.7 § 3.2 ¶ 5 The organizational structure and the functional responsibility assignment shall be such that:</p>	The organizational structure and the responsibility assignments shall be such that:	Similar requirement.
<p>N45.2 § 3 ¶ 4 (1) attainment of quality objectives is accomplished by those who have been assigned responsibility for performing work; e.g. the designer, the welder, or the nuclear facility operator. This may include interim examinations, checks, and inspections of the work by the individual performing the work.</p> <p>N18.7 § 3.2 ¶ 5 (1) Attainment of program objectives is accomplished by those who have been assigned responsibility for performing work. This may include interim examinations, checks, and inspections of the work by the individual performing the work.</p>	(a) quality is achieved and maintained by those who have been assigned responsibility for performing work; and	Similar requirement.
<p>N45.2 § 3 ¶ 4 (2) verification of conformance to established quality requirements is accomplished by those who do not have direct responsibility for performing the work; e.g., the design reviewer, the checker, the inspector, or the tester</p> <p>N18.7 § 3.2 ¶ 5 (2) Verification of conformance to established program requirements is accomplished by a qualified person who does not have responsibility for performing or directly supervising the work. The method and extent of such verification shall be commensurate with the importance of the activity to plant safety and reliability.</p>	(b) quality achievement is verified by persons or organizations not directly responsible for performing the work.	Similar requirement. N18.7 includes a statement that the verification also cannot be done by the person directly supervising the work. NQA-1 addresses the independence in the respective sections of design control (Criterion III), inspection (Criterion X), and testing (Criterion XI). There is no specific requirement or definition for “the checker” as stated in N45.2. This checking could be accomplished by any of the other three functions.
	2.2 Delegation of Work	
<p>N45.2 § 1.3 ¶ 1 – The facility owner or his designated representative and other organizations are also responsible for assuring that the necessary and appropriate requirements of this standard are invoked. The facility owner may delegate to other organizations the work of establishing and executing the Quality Assurance Program or any part thereof, but shall retain responsibility for overall program effectiveness. In no</p>	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 therefore.	Similar requirement for N45.2 and NQA-1. N18-7 goes into details that are covered in the integrated QAPD through other sections of Section 1, Organization, such as description of site executive management and nuclear oversight. However, overall the QAPD and NQA-1-1994 meet the intent of these sections for both N45.2 and N18.7.

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<p>way shall the program operate to diminish the responsibility of any contractor for the quality of items or services furnished or for execution of the contractor's designated portion of the Quality Assurance Program. ANS N18.7 § 3.4.2 The Plant Manager shall have overall responsibility for the execution of the administrative controls and quality assurance program at the plant to assure safety. An individual or organizational unit knowledgeable and experienced in nuclear power plant operational phase activities and quality assurance practices shall be designated and assigned the responsibility to verify that the program is being effectively implemented. Depending on the organizational structure, the individual or organizational unit may report functionally to onsite plant management or an offsite organization (see also 3.2). Reporting to onsite plant management is preferable since such an arrangement actually results in improved communications in identifying problems and initiating corrective action. The individual or organizational unit in this case may receive technical guidance from offsite support groups. This individual's or organizational unit's duties and responsibilities shall be such that the required attention can be devoted, as required, to verifying that the program is being effectively executed. The individual or organizational unit shall report on the effectiveness of the program to the Plant Manager and to other cognizant management as may be designated. Their activities shall be periodically audited by designated offsite personnel.</p>		
	<p>2.3 Nonconforming Items</p>	
	<p>Responsibility for the control of further processing, delivery, installation, or operation of nonconforming items shall be designated in writing.</p>	<p>Addressed in implementing procedures.</p>
	<p>3 MULTIPLE ORGANIZATIONS</p>	
	<p>3.1 Responsibility</p>	
<p>N45.2 § 3 ¶ 1 – Where multiple organizational arrangements exist, the responsibility of each organization shall be clearly established. N45.2 § 3 ¶ 5 In structuring the organization and assigning responsibility, quality assurance should be recognized as an interdisciplinary function involving many organizational components and, therefore, should</p>	<p>Where more than one organization is involved in the execution of activities covered by this Part (Part I), the responsibility and authority of each organization shall be clearly established and documented.</p>	<p>Similar requirement. Additional explanatory information from N45.2 and N18.7 is more a factor of the founding principles and policy of quality assurance. Much of this is addressed in the Policy section of the QAPD. Additional information is contained in the various sections of the QAPD related to the specific functions such as inspections, testing,</p>

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<p>not be regarded as the sole domain of a single quality assurance group. For example, it may be more appropriate for design engineers to perform design reviews rather than quality assurance engineers because of the special competence required to perform these reviews. Quality assurance encompasses many functions and activities and extends to various levels in all participating organizations, from the top executive to all workers whose activities may influence quality.</p> <p>N18.7 § 3.2 In structuring the organization and assigning responsibility, quality assurance should be recognized as an interdisciplinary function involving many organizational components and, therefore, should not be regarded as the sole domain of a single quality assurance group. For example, it may be more appropriate for nuclear engineers to perform reviews of plant nuclear engineering activities rather than quality assurance engineers because of the special competence required to perform these reviews. Quality assurance encompasses many functions and activities and extends to various levels in all participating organizations, from the top executive to all workers whose activities may influence quality.</p>		<p>auditing, design reviews, and independent reviews by the review bodies and the SNS function.</p>
<p>N18.7 § 3.4 Onsite Operating Organization</p> <p>3.4.1 General. A number of factors influence management in its decision regarding the establishment of an onsite operating organization. These include the owner organization's established staffing policies, the physical size and complexity of the nuclear power plant, the number of units, the extent of assistance provided by offsite technical support organizations, the extent of reliance on consultants and the availability of qualified personnel from other sources to assist in activities, such as initial start-up, refueling, maintenance or modification work.</p> <p>A nuclear power plant onsite operating organization may change with time. For example, the number and qualifications of personnel making up the onsite technical support staff can generally be reduced as a plant progresses through initial operation to operational maturity. Management shall give careful consideration to</p>	<p>3.2 Interface Control</p> <p>3.2.1 The external interfaces between organizations and the internal interfaces between organizational units, and changes thereto, shall be documented.</p>	<p>N45.2 and N18.7 only address interface control with external organizations related to the design control function. However, this should have further controls where external organizations provide a quality function for the facility, such as a contractor performing construction activities, or providing an audit service, as well as other functions.</p> <p>N18.7 focuses only on the onsite operating organization functions. This particular section provides more of a philosophy on the initial onsite organization and changes thereto rather than any specific requirements.</p>

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the timing and extent of such changes.		
	3.2.2 Interface responsibilities shall be defined and documented.	
<p>N18.7 § 3.4.2 Requirements for the Onsite Operating Organization. The onsite operating organization shall include one or more individuals knowledgeable in the following fields: nuclear power plant operation; nuclear power plant mechanical, electrical and electronic systems; nuclear engineering; chemistry and radiochemistry; radiation protection; and quality assurance. Initial incumbents or replacements for members of the onsite operating organization and offsite technical support organizations shall have appropriate experience, training and retraining to assure that necessary competence is maintained in accordance with the provisions of American National Standard for Selection and Training of Nuclear Power Plant Personnel, N18.1-1971. [4] Personnel whose qualifications do not meet those specified in N18.1 and who are performing inspection, examination, and testing activities during the operations phase of the plant, including preoperational and start-up testing, shall be qualified to American National Standard Qualifications of Inspection, Examination, and Testing Personnel for the Construction Phase of Nuclear Power Plants, N45.2.6-1973 [5], except that the QA experience cited for Levels I, II, and III should be interpreted to mean actual experience in carrying out the types of inspection, examination, or testing activity being performed.</p> <p>The owner organization shall designate those positions in the onsite operating organization, which shall be filled by personnel holding NRC reactor operator and senior reactor operator licenses. Requirements for the minimum number of personnel holding such licenses who shall be present at the plant under various operating conditions and situations shall also be specified.</p>		<p>N18.7 provides specific requirements for the minimum discipline experience of the onsite operating staff. The experience and qualification requirements for selecting and training onsite and offsite staff are addressed in Section 2 of the QAPD and the company commitment to Reg. Guide 1.8 as defined in that section.</p> <p>N18.7 also addresses positions requiring NRC license requirements. This is likewise addressed in Section 2 of the QAPD and the specific commitment to Reg. Guide 1.8 addressed therein.</p> <p>N18.7 requires the minimum staffing levels of licensed personnel who shall be present during various operating conditions and situations to be specified. These staffing levels will be specified in the applicable facilities' technical specifications rather than the QAPD.</p>

CRITERION 2 ANSI N45.2-1977/N18.7-1976	BASIC REQUIREMENT 2 NQA-1 1994	COMMENTS
2. QUALITY ASSURANCE PROGRAM		
N45.2 §1.3 ¶1 – It is the responsibility of the facility owner to provide for the establishment and execution of a Quality Assurance Program for the facility consistent with the provisions of this standard.	A documented quality assurance program shall be planned, implemented, and maintained in accordance with this Part (Part I), or portions thereof.	Similar requirement.
N45.2 §1.3 ¶1 – The facility owner or his designated representative and other organizations invoking this standard are responsible for identifying the structures, systems, and components and for specifying the extent to which the provisions of this standard apply. §2 ¶3 – The program shall identify the items and services to which this and other standards apply.	The program shall identify the activities and items to which it applies.	Similar requirement.
N45.2 §2 ¶1 – The establishment of the program shall include considerations of the technical aspects of the activities to be performed. The program shall contain provisions to assure identification of and compliance with requirements of pertinent ANSI and other recognized and appropriate engineering codes, standards, requirements, and practices.	The establishment of the program shall include consideration of the technical aspects of the activities affecting quality.	Similar requirement.
N45.2 §2 ¶3 – Since items and services will differ in regard to relative safety, reliability, and performance importance, various methods or levels of control and verification may be used to assure adequate quality. Regardless of the methods or levels used, the program shall provide for the assurance of quality consistent with applicable codes, standards, and other requirements. Some factors to be considered in assigning methods or levels of quality assurance are as follows: (1) the consequence of malfunction or failure of the item; (2) the design and fabrication complexity or uniqueness 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; (5) the quality history and degree of standardization of the item; (6) the difficulty of repair or replacement	The program shall provide control over activities affecting quality to an extent consistent with their importance.	Similar requirement.
N45.2 §2 ¶1 – A documented Quality Assurance Program which complies with the applicable sections and elements of this standard shall be established at the earliest	The program shall be established at the earliest time consistent with the schedule for accomplishing the activities.	Similar requirement.

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<p>practical time consistent with the schedule for accomplishing the activities for the nuclear facility.</p>		
<p>N45.2 §2 ¶6 – The program shall provide for the accomplishment of activities affecting quality 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. 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, examination, or test.</p>	<p>The program shall provide for the planning and accomplishment of activities affecting quality 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. The program shall provide for any special controls, processes, test equipment, tools, and skills to attain the required quality and for verification of quality.</p>	<p>Similar requirements.</p>
<p>N45.2 -The program shall define the organizational structure within which the Quality Assurance Program is to be planned and implemented and shall clearly delineate the responsibility and authority of the various personnel and organizations involved.</p>	<p>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.</p>	<p>Organizational structure is covered in Basic Requirement 1 of NQA-1 and Section 1 of the QAPD. NQA-1 focuses on indoctrination and training of personnel under this basic requirement, as covered in QAPD, Section 2.</p>
<p>The program shall provide for the regular review, by management of organizations participating in the program, of the status and adequacy of that part of the Quality Assurance Program for which they have designated responsibility.</p>	<p>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.</p>	<p>Similar requirement.</p>
<p>Note: ANSI N45.2.6 addresses the qualification of inspection and test personnel.</p>	<p>Note: Supplement 2S-1 provides requirements while Appendix 2A-1 is considered nonmandatory (by NQA-1) guidance on qualification of inspection and test personnel.</p>	<p>NRC Reg. Guides 1.8 and 1.28 require using NQA-1, Appendix 2A-1 for inspection and test personnel qualification.</p>
<p>ANSI N45.2.6 QUALIFICATIONS OF INSPECTION, EXAMINATION AND TESTING PERSONNEL FOR NUCLEAR POWER PLANTS</p>	<p>SUPPLEMENT 2S-1 Supplementary Requirements for the Qualification of Inspection and Test Personnel</p>	
<p>1. INTRODUCTION</p>	<p>1 GENERAL</p>	
<p>1.1 Scope</p>		
<p>This Standard delineates the requirements for the qualification of personnel who perform inspection, examination, and testing to verify conformance to specified requirements of nuclear power plant items (structures, systems, and components of nuclear power</p>	<p>This Supplement provides amplified requirements for the qualification of personnel who perform inspection and testing to verify conformance to specified requirements for the purpose of acceptability.</p>	<p>NQA-1 does not define “examination” separate from inspection and testing, but the intent is the same.</p>

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<p>plants) whose satisfactory performance is required to prevent postulated accidents which 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. The requirements may also be extended to other items of nuclear power plants when specified in contract documents.</p> <p>Regulatory Guide-1.58 C-1 “The requirements for qualification of nuclear power plant inspection, examination, and testing personnel (4) that are included in ANSI N45.2.6-1978 are acceptable to the NRC staff and provide an adequate basis for complying with the pertinent quality assurance requirements of Appendix B to CFR Part 50, subject to the following:</p> <p>(4)The terms "inspection," "examination," and "testing" are defined in Section 1.4, "Definition," of ANSI N45.2.6-1978. 1. Section 1.2, "Applicability," of ANSI N45.2.6-1978 states that the standard applies "to personnel who perform inspections, examinations, and tests. . .during preoperational and startup testing, and during operational phases of nuclear power plants." However, for qualification of personnel (1) who approve preoperational, startup, and operational test procedures and test results and (2) who direct or supervise the conduct of individual preoperational, startup, and operational tests, the guidelines contained in Regulatory Guide 1.8, "Personnel Selection and Training," should be followed in lieu of the guidelines of ANSI N45.2.6-1978.”</p>		
1.2 Applicability		
<p>The requirements of this Standard apply to personnel who perform inspections, examinations, and tests during fabrication prior to and during receipt of items at the construction site, during construction, during preoperational and startup testing, and during operational phases of nuclear power plants. The requirements of this Standard do not apply to personnel who perform inspections for government or municipal authorities, or who perform as authorized inspectors in accordance with the ASME Boiler and Pressure Vessel Code. The</p>		<p>Applicability of NQA-1-1994 is addressed in the Introduction (Section I- 2, not in each section.)</p>

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<p>requirements of this Standard are not intended to apply to personnel who only perform inspection, examination, or testing in accordance with ANST "Recommended Practice No. SNT-TC-1A", since these personnel are certified in accordance with the requirements of SNT-TC-1A and its applicable supplements. The requirements of this Standard are optional, at the discretion of the employer, for application to personnel who perform calibration or to craftsmen who perform installation checkouts as part of their basic installation responsibility to ready the installation for preoperational testing.</p> <p>Regulatory Guide-1.58 C-2. Section 1.2, "Applicability," of ANSI N45.2.6-1978 states: "The requirements of this Standard are not intended to apply to personnel who only perform inspection, examination, or testing in accordance with ASNT 'Recommended Practice No. SNT-TC-1A', since these personnel are certified in accordance with the requirements of SNT-TC-1A and its applicable supplements." SNT-TC-1A-1975 is acceptable for the qualification of personnel performing nondestructive examinations and should be used where applicable, subject to the following: a. SNT-TC-1A-1975 applies to qualification of nondestructive testing personnel for the following nondestructive test methods: (1) Radiographic Testing; (2) Magnetic Particle Testing; (3) Ultrasonic Testing; (4) Liquid Penetrant Testing;(5) Eddy Current Testing;(6) Neutron Radiographic Testing; and (7) Leak Testing. b. For qualification of personnel performing nondestructive examinations required by Section III and Section XI of the ASME Boiler and Pressure Vessel Code, SNT-TC-1A-1975 should be used in conjunction with the additional provisions of the Code.</p> <p>Regulatory Guide-1.58 C-3. Section 1.2, "Applicability," of ANSI N45.2.6-1978 states: "The ASME Boiler and Pressure Vessel Code, as well as other ANSI Standards, have been considered in the development of the Standard, and this Standard is intended to be compatible with their requirements." While Section III and Section XI of the ASME Boiler and Pressure Vessel Code address requirements for the qualifications of certain personnel who perform inspection, examination, and testing, these</p>		

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<p>sections do not address the qualification of all personnel described in ANSI Standard N45.2.6.-1978. ANSI N45.2.6-1978, subject to the exceptions of the regulatory positions, should be used in conjunction with Section III and Section XI of the ASME Boiler and Pressure Vessel Code for the qualification of inspection, examination, and testing personnel where the ASME Code does not address the requirements covered by ANSI N45.2.6-1978. Regulatory Guide-1.58 C-4. Section 1.5, "Referenced Documents," of ANSI N45.2.6-1978 states: "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 6 of this Standard." The specific applicability or acceptability of listed standards has been or will be covered separately in other regulatory guides, where appropriate. Regulatory Guide-1.58 C-9. Section 1.2, "Applicability," of ANSI N45.2.6-1978 states: "The requirements of this Standard do not apply to personnel who perform inspections for government or municipal authorities, or who perform as authorized inspectors in accordance with the ASME Boiler and Pressure Vessel Code." The requirements and recommendations of ANSI N45.2.6-1978, subject to the provisions of Regulatory Positions 1 through 8, are considered acceptable for use by or for all NRC permit holders and licensees, including those that are government or municipal authorities.</p>		
<p>This Standard is to be used in conjunction with ANSI N45.2. The requirements apply to personnel of the owners, architect-engineers, nuclear power plant system designers and system suppliers, plant designers and plant constructors, equipment suppliers, outside testing agencies, and consultants. The ASME Boiler and Pressure Vessel Code, as well as other ANSI Standards have been considered in the development of the standard, and this Standard is intended to be compatible with their requirements.</p>		<p>NQA-1 incorporates ANSI N45.2. NQA-1 is also intended to be compatible with ASME Boiler and Pressure Vessel Code.</p>
<p>1.3 Responsibility</p>		
<p>It is the responsibility of each organization participating in</p>		<p>Responsibility is defined in the</p>

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<p>the project to assure that only those personnel within their respective organizations who meet the requirements of this Standard are permitted to perform inspection, examination, and testing activities covered by this Standard that verify conformance to quality requirements.</p>		<p>Introduction to Part I of NQA-1-1994, Section 3.</p>
<p>The organization or organizations responsible for establishing the applicable requirements for activities covered by this Standard shall be identified and the scope of their responsibility shall be documented. The work of establishing selection and training practices and qualification procedures and of providing the resources in terms of personnel, equipment, and services necessary to implement the requirements of this Standard, may be delegated to other qualified organizations and such delegations be documented. It is the responsibility of each organization using personnel covered by this Standard to conform to the requirements of this Standard applicable to the organization's work. It is the responsibility of the organization performing these activities to specify the detailed methods and procedures for meeting the requirements of this Standard, unless they are specified in the contract documents.</p>		
<p>1.4 Definitions</p>		
<p>1.4.1 Inspection. A phase of quality control which by means of examination, observation, or measurement determines the conformance of materials, supplies, parts, components, appurtenances, systems, processes, or structures to predetermined quality requirements</p>	<p>inspection - examination or measurement to verify whether an item or activity conforms to specified requirements (From NQA-1-1994, Part I - Introduction)</p>	<p>Similar</p>
<p>1.4.2 Examination. An element of action consisting of investigation of materials, supplies, parts, components, appurtenances, systems, processes, or structures to determine conformance to those specified requirements which can be determined by such investigation. Examination is usually nondestructive and includes simply physical manipulation, gaging, and measurement</p>	<p>(NQA-1-1994, Part II definitions) 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.</p>	<p>NQA-1 Subpart 2.8 defines examination similar to ANSI N45.2.6</p>
<p>1.4.3 Testing. The determination or verification of the capability of an item to meet specified requirements by</p>	<p>testing - an element of verification for the determination of the capability of an item to meet specified requirements by</p>	<p>NQA-1 defines testing similar to ANSI N45.2.6</p>

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subjecting the item to a set of physical, chemical, environmental, or operating conditions.	subjecting the item to a set of physical, chemical, environmental, or operating conditions	
1.4.4 Refer to ANSI N45.2.10 for other definitions to be used in conjunction with this Standard.		NQA-1 contains definitions in the Introduction to Part I that are used with this section.
	It supplements the requirements of Basic Requirement 2 of this Part (Part I) and shall be used in conjunction with that Basic Requirement when and to the extent specified by the organization invoking this Part (Part I). The requirements of this Supplement do not apply to the qualification of personnel for performance of nondestructive examination.	Not a requirement.
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 6 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 6 of this Standard.		Not a requirement.
N18.7 - 3.3 Indoctrination and Training.	2 CERTIFICATION	
Provisions shall be made for indoctrination and training of those personnel in the owner organization performing activities affecting quality to assure that suitable proficiency is achieved and maintained. Such personnel also shall be provided training concerning the administrative controls and quality assurance program which, as a minimum, shall include the following areas: overall company policies, procedures, or instructions which establish the program; procedures or instructions which implement the program related to the specific job-related activity.		N18.7 and NQA-1 have similar requirements for qualification and training. NQA-1 covers this with section 2.1 through 2.7 below. In addition, NQA-1, SUPPLEMENT 2S-4, calls out additional indoctrination and training requirements. Intent of the standards is consistent, although NQA-1-1994 is more specific.
2. GENERAL REQUIREMENTS	2.1 Qualification Requirements	
2.1 Planning		
Plans shall be developed for staffing, indoctrination, and training of an adequate number of personnel to perform the required actions, examinations, and tests and shall reflect the schedule of project activity so as to know adequate time for assignment or selection and training of the required personnel.		NQA-1 addresses Planning in Part II.

<p align="center">CRITERION 2 ANSI N45.2-1977/N18.7-1976</p>	<p align="center">BASIC REQUIREMENT 2 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>4. PERFORMANCE Personnel who are assigned the responsibility and authority to perform functions covered by this Standard shall have, as a minimum, the level of capability shown in Table 1. When a single inspection or test requires implementation by a team or group, personnel not meeting the requirements of this Standard may be used in data-taking assignments or in plant or equipment operation provided they are supervised or overseen by a qualified individual participating in the inspection, examination, or test. Regulatory Guide-1.58 C-7. Section 4, "Performance," of ANSI N45.2.6-1978 states: "When a single inspection or test requires implementation by a team or group, personnel not meeting the requirements of this Standard may be used in data-taking assignments or in plant or equipment operation provided they are supervised or overseen by a qualified individual participating in the inspection, examination, or test." These personnel should have sufficient training to ensure an acceptable level of competence in the performance of their activities.</p>	<p>The responsible organization shall designate those activities that require qualified inspection and test personnel and the minimum requirements for such personnel. Further, the responsible organization shall establish written procedures for the qualification of inspection and test personnel, and for the assurance that only those personnel who meet the requirements of this Supplement are permitted to perform inspection and test activities. When a single inspection or test requires implementation by a team or a group, personnel not meeting the requirements of this Part (Part I) may be used in data-taking assignments or in plant or equipment operation, provided they are supervised or overseen by a qualified individual.</p>	<p>Similar requirements. Rather than NQA-1 containing a table for levels of capability the information is contained in Appendix 2A-1.</p>
	2.2 Personnel Selection	
	Personnel selected for performing inspection and test activities shall have the experience or training commensurate with the scope, complexity, or special nature of the activities.	
2.1.1 Indoctrination.	2.3 Indoctrination	
Provisions shall be made for the indoctrination of personnel as to the technical objectives of the project; the codes and standards that are to be used; and the quality assurance elements that are to be employed.	Provisions shall be made for the indoctrination of personnel as to the technical objectives and requirements of the applicable codes and standards, and the quality assurance program elements that are to be employed.	
2.1.2 Training.	2.4 Training	
The need for formal training programs shall be determined, and such training activities shall be conducted as required to qualify personnel who perform inspections, examinations, and tests.	The need for a formal training program shall be determined, and such training activities shall be conducted as required to qualify personnel who perform inspections and tests.	
On-the job participation shall also be included in the program, with emphasis on first-hand experience gained	On-the-job training shall also be included in the program, with emphasis on first-hand experience gained through	

<p align="center">CRITERION 2 ANSI N45.2-1977/N18.7-1976</p>	<p align="center">BASIC REQUIREMENT 2 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>through actual performance of actions, examinations, and tests.</p>	<p>actual performance of inspections and tests.</p>	
<p>Records of training, when used as the basis for certification, shall be maintained.</p>		<p>Records are addressed in Section 3 of this Supplement to NQA-1.</p>
<p>2.2 Determination of Initial Capability</p>	<p>2.5 Determination of Initial Capability</p>	
<p>The capabilities of a candidate for certification shall be initially determined by a suitable evaluation of the candidate's education, experience, training, test results, or capability demonstration. Regulatory Guide-1.58 C-10. Section 2.2, "Determination of Initial Capability," and Section 2.3, "Evaluation of Performance," of ANSI N45.2.6-1978 deal with the use of evaluation of job performance and determination of initial capability to perform the job. Use of the measures outlined in these sections to establish that an individual has the required qualifications in lieu of required education and experience should result in documented objected evidence (i.e., procedures and record of written test) demonstrating that the individual indeed does have "comparable" or "equivalent" competence to that which would be gained from having the required education and experience.</p>	<p>The capabilities of a candidate for certification shall be initially determined by a suitable evaluation of the candidate's education, experience, training, and either test results or capability demonstration.</p>	<p>Note Dominion nuclear facilities were previously committed to Regulatory Guide 1.58, which was withdrawn by the NRC based on acceptance of NQA-1-1983. The NRC has accepted NQA-1-1994 as equivalent to NQA-1-1983 (Exelon SER), therefore any specific reference in this table to RG 1.58 is met or superceded by use of NQA-1.</p>
<p>2.3 Evaluation of Performance</p>	<p>2.6 Evaluation of Performance</p>	
<p>The job performance of inspection, examination, and testing personnel shall be reevaluated at periodic intervals not to exceed three years.</p>	<p>The job performance of inspection and test personnel shall be reevaluated at periodic intervals not to exceed 3 years.</p>	<p>This requirements of this subsection are similar for ANSI N45.2.6 and NQA-1-1994.</p>
<p>Reevaluation shall be by evidence of continued satisfactory performance or redetermination of capability in accordance with Subsection 2.2.</p>	<p>Reevaluation shall be by evidence of continued satisfactory performance or re-determination of capability in accordance with the requirements of para. 2.5 above.</p>	
<p>If, during this evaluation or at any other time, it is determined by the responsible organization that the capabilities of an individual are not in accordance with the qualifications specified for the job, that person shall be removed from that activity until such time as the required capability has been demonstrated</p>	<p>If during this evaluation or at any other time, it is determined by the responsible organization that the capabilities of an individual are not in accordance with the qualification requirements specified for the job, that person shall be removed from that activity until such time as the required capability has been demonstrated.</p>	
<p>Any person who has not performed inspection, examination, or testing activities in his qualified area for a period of one year shall be reevaluated by a redetermination of required capability in accordance with</p>	<p>Any person who has not performed inspection or testing activities in his qualified area for a period of 1 year shall be reevaluated by a re-determination of required capability in accordance with the requirements of para. 2.5 above.</p>	

CRITERION 2 ANSI N45.2-1977/N18.7-1976	BASIC REQUIREMENT 2 NQA-1 1994	COMMENTS
Subsection 2.2.		
2.4 Written Certification of Qualification	2.7 Certificate of Qualification	
The qualification of personnel shall be certified in writing in an appropriate form, including the following information:	The qualification of personnel shall be certified in writing in an appropriate form, including the following information:	This requirements of this subsection are virtually the same in both standards.
1. employer's name	(a) employer's name;	
2. identification of person being certified	(b) identification of person being certified;	
3. level of capability		
4. activities certified to perform	(c) activities certified to perform;	
5. basis used for certification, including:	(d) basis used for certification, which includes such factors as:	
(a) records of education, experience and training	(1) education, experience, indoctrination, and training	
(b) test results, where applicable	(2) test results, where applicable	
(c) results of capability demonstration	(3) results of capability demonstration	
6. results of periodic evaluations	(e) results of periodic evaluation;	
7. results of physical examinations, when required	(f) results of physical examinations, when required;	
8. signature of employer's designated representative	(g) signature of employer's designated representative who is responsible for such certification;	Clarification in NQA-1
9. date of certification and date of certification expiration	(h) date of certification and date of certification expiration.	
2.5 Physical	2.8 Physical	
The responsible organization shall identify any special physical characteristics needed in the performance of each activity. Personnel requiring these characteristics shall have them verified by examination at intervals not to exceed one year.	The responsible organization shall identify any special physical characteristics needed in the performance of each activity, including the need for initial and subsequent physical examination.	Similar requirements. NQA-1 requires "Subsequent examinations" whereas N45.2 requires "intervals not to exceed one year."
3. QUALIFICATIONS	The following information is from Appendix 2A-1	
3.1 General	1 GENERAL	
The requirements contained within this Section define the minimum capabilities that qualify personnel to perform inspections, examinations, and tests which are within the scope of this Standard. There are three levels of qualification. The requirements for each level are not limiting with regard to organizational position of professional status, but rather, are limiting with regard to functional activities which are within the scope of this Standard.	This Appendix provides nonmandatory guidance on the qualifications of inspection and test personnel. This Appendix may be used in conjunction with Basic Requirement 2 and Supplement 2S-1 of Part I. 2 FUNCTIONAL QUALIFICATIONS Three levels of qualification may be utilized depending on the complexity of the functions involved. The recommendations for each level are not limiting with regard to organizational position or professional status but, rather, are limiting with regard to functional activities.	NQA-1-1994, Supplement 2S-1, Supplementary Requirements for the Qualification of Inspection and Test Personnel will include use of the guidance provided in Appendix 2A-1, or the proposed alternatives as approved.

CRITERION 2 ANSI N45.2-1977/N18.7-1976	BASIC REQUIREMENT 2 NQA-1 1994	COMMENTS
	<p>Proposed alternative to qualification requirements for Dominion QA Program - (1) The company may choose to not specifically use the designations of Level I, II, and III for qualification of inspectors. However, the qualification program will ensure that only personnel that meet the required education and experience requirements, and have demonstrated appropriate capabilities in the inspection activities they are assigned will be certified and used to perform those inspections. The inspectors used in planning inspections will meet or exceed the education and experience requirements of for a Level II inspector plus have an additional three years of related inspection experience for nuclear facilities. The inspectors used to evaluate the capabilities of other inspectors will meet or exceed the education and experience requirements for a Level II inspector plus have an additional five years of related experience in inspection, examination, or testing activities for nuclear facilities. This related experience may include ASME VT 1, 2, or 3 examinations, NDE, or ASME Section XI inservice inspection or testing activities. A qualified engineer may also be used to evaluate the capabilities of an inspector. The training program for inspectors will be evaluated and approved by personnel who meet the education, experience, and capabilities designated for a Level III person specific to the discipline or a qualified engineer. For the purposes of this alternative, a qualified engineer is one who has a baccalaureate in engineering in a discipline related to the inspection activity (such as, electrical, mechanical, civil) and has a minimum of five years engineering work experience with at least two years of this experience related to nuclear facilities.</p> <p>(2) As an alternative to the education requirement of high school graduation (or GED), satisfactory demonstration of reading, writing, and mathematical skills through completion of an NANT accredited training development program or an approved inspector training program for nuclear facility personnel will be deemed equivalent.</p>	
	The following information on Level I, II, and III is	

CRITERION 2 ANSI N45.2-1977/N18.7-1976	BASIC REQUIREMENT 2 NQA-1 1994	COMMENTS
	from Appendix 2A-1	
3.2 Level I Personnel Capabilities	2.1 Level I Personnel Capabilities	
A Level I person shall be capable of performing the inspections, examinations, and tests that are required to be performed in accordance with documented procedures and/or industry practices. The individual shall be familiar with the tools and equipment to be employed and shall have demonstrated proficiency in their use. The individual shall also be capable of determining that the calibration status of inspection and measuring equipment is current, that the measuring and test equipment is in proper condition for use, and that the inspection, examination, and test procedures are approved.	A Level I person should be capable of performing and documenting the results of inspections or tests that are required to be performed in accordance with documented procedures, acceptance standards, and/or industry practices as defined in user's written procedures.	Similar capabilities described.
3.3 Level II Personnel Capabilities	2.2 Level II Personnel Capabilities	
A Level II person shall have all of the capabilities of a Level I person for the inspection, examination or test category or class in question. Additionally, a Level II person shall have demonstrated capabilities in planning inspections, examinations, and test; in setting up tests including preparation and set-up of related equipment, as appropriate; in supervising or maintaining surveillance over the inspections, examinations, and tests; in supervising and certifying lower level personnel; in reporting inspection, examination, and testing results; and in evaluating the validity and acceptability of inspection, examination, and test results	A Level II person should have all of the capabilities of a Level I person for the inspection or test category or class in question. Additionally, a Level II person should have demonstrated capabilities in planning inspections and tests; in setting up tests, including preparation and setup of related equipment, as appropriate; in supervising or maintaining surveillance over the inspections and tests; in supervising and certifying lower level personnel; and in evaluating the validity and acceptability of inspection and test results.	Similar capabilities described.
3.4 Level III Personnel Capabilities	2.3 Level III Personnel Capabilities	
A Level III person shall have all of the capabilities of a Level II person for the inspection, examination or test category or class in question. In addition, the individual shall also be capable of evaluating the adequacy of specific programs used to train and test inspection, examination, and test personnel whose qualifications are covered by this Standard. Regulatory Guide-1.58 C-5. Section 3.4, "Level III Personnel Capabilities," of ANSI N45.2.6-1978 specifies the capability requirements of Level III personnel. In additional, the individual should be capable of reviewing	A Level III person should have all of the capabilities of a Level II person for the inspection or test category or class in question. in addition, the individual should also be capable of evaluating the adequacy of specific programs used to train and certify inspection and test personnel whose qualifications are covered by this Appendix.	Similar capabilities described.

<p align="center">CRITERION 2 ANSI N45.2-1977/N18.7-1976</p>	<p align="center">BASIC REQUIREMENT 2 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>and approving inspection, examination, and testing procedures and of evaluating the adequacy of such procedures to accomplish the inspection, examination, and test objectives.</p>		
	<p>The following information on education and experience is from Appendix 2A-1</p>	
<p>3.5 Education and Experience - Recommendations</p>	<p>3 EDUCATION AND EXPERIENCE QUALIFICATIONS</p>	
<p>The following is the recommended personnel education and experience for each level. These education and experience recommendations should be treated to recognize that other factors may provide reasonable assurance that a person can competently perform a particular task. Other factors which may demonstrate capability in a given job are previous performance or satisfactory completion of capability testing Regulatory Guide-1.58 C-6. Section 3.5, "Education and Experience-Recommendations," of ANSI N45.2.6.-1978 states that the education and experience specified are recommendations and that other factors may provide reasonable assurance that a person can competently perform a particular task. The set of recommendations has been reviewed by the NRC staff and found to be acceptable with one exception. In addition to the recommendations listed under Section 3.5 for Level I, II, and III personnel, the candidate should be a high school graduate or have earned the General Education Development equivalent of a high school diploma. Since only one set of recommendations is provided for the education and experience of personnel, a commitment to comply with the regulatory positions of this guide in lieu of providing an alternative to the recommendations of the standard means that the specified education and experience recommendations of the standard will be followed.</p>	<p>These education and experience recommendations should be considered with recognition that other factors commensurate with the scope, complexity, or special nature of the activity may provide reasonable assurance that a person can competently perform a particular task. Other factors which may demonstrate capability in a given job are previous performance or satisfactory completion of capability testing. These factors and the basis for their equivalency should be documented.</p>	<p>Similar recommendations.</p>
<p>3.5.1 Level I</p>	<p>3.1 Level I</p>	
<p>1. Two years of related experience in equivalent inspection, examination, or testing activities, or</p>	<p>3.1.1 Two years of related experience in equivalent inspection or testing activities; or</p>	<p>Similar recommendations.</p>

CRITERION 2 ANSI N45.2-1977/N18.7-1976	BASIC REQUIREMENT 2 NQA-1 1994	COMMENTS
2. High school graduation and six months of related experience in equivalent inspection, examination, or testing activities, or	3.1.2 High school graduation and 6 months of related experience in equivalent inspection or testing activities; or	Similar recommendations.
3. Completion of college level work leading to an Associate Degree in a related discipline plus three months of related experience in equivalent inspection, examination, or testing activities.	3.1.3 Completion of college level work leading to an associate degree in a related discipline plus 3 months of related experience in equivalent inspection or testing activities.	Similar recommendations.
3.5.2 Level II	3.2 Level II	
1. One year of satisfactory performance as Level I in the corresponding inspection, examination or test category or class, or	3.2.1 One year of satisfactory performance as a Level I in the corresponding inspection or test category or class; or	Similar recommendations.
2. High school graduation plus three years of related experience in equivalent inspection, examination, or testing activities, or	3.2.2 High school graduation plus 3 years of related experience in equivalent inspection or testing activities; or	Similar recommendations.
3. Completion of college level work leading to associate Degree in a related discipline plus one year related experience in equivalent inspection, examination, or testing activities, or	3.2.3 Completion of college level work leading to an associate degree in a related discipline plus 1 year of related experience in equivalent inspection or testing activities; or	Similar recommendations.
4. Four-year college graduation plus six months of related experience in equivalent inspection, examination, or testing activities	3.2.4 Graduation from a 4 year college plus 6 months of related experience in equivalent inspection or testing activities.	Similar recommendations.
3.5.3 Level III	3.3 Level III	
1. Six years of satisfactory performance as a Level II in the corresponding inspection, examination or test category or class, or	3.3.1 Six years of satisfactory performance as a Level II in the corresponding inspection or test category or class; or	Similar recommendations.
2. High school graduation plus ten years of related experience in equivalent inspection, examination, or testing activities; or high school graduation plus eight years experience in equivalent inspection, examination, or testing activities, with at least two years as Level II, and with at least two years associated with nuclear facilities-or if not, at least sufficient training to be acquainted with the relevant quality assurance aspects of a nuclear facility, or	3.3.2 High school graduation plus 10 years of related experience in equivalent inspection or testing activities; or high school graduation plus 8 years of experience in equivalent inspection or testing activities with at least 2 years as a Level II and with at least 2 years associated with nuclear facilities - or, if not, at least sufficient training to be acquainted with the relevant quality assurance aspects of a nuclear facility; or	Similar recommendations.
3. Completion of college level work leading to an associate Degree and seven years of related experience in equivalent inspection, examination, or testing activities, with at least two years of this experience associated with nuclear facilities-or if not, at least sufficient training to be	3.3.3 Completion of college level work leading to an associate degree and 7 years of related experience in equivalent inspection or testing activities with at least 2 years of this experience associated with nuclear facilities - or, if not, at least sufficient training to be acquainted with	Similar recommendations.

CRITERION 2 ANSI N45.2-1977/N18.7-1976	BASIC REQUIREMENT 2 NQA-1 1994	COMMENTS
acquainted with the relevant quality assurance aspects of a nuclear facility, or	the relevant quality assurance aspects of a nuclear facility; or	
4. Four-year college graduation plus five years of related experience in equivalent inspection, examination, or testing activities, with at least two years of this experience associated with nuclear facilities-or if not, at least sufficient training to be acquainted with the relevant quality assurance aspects of a nuclear facility.	3.3.4 Graduation from a 4 year college plus 5 years of related experience in equivalent inspection or testing activities with at least 2 years of this experience associated with nuclear facilities - or, if not, at least sufficient training to be acquainted with the relevant quality assurance aspects of a nuclear facility.	Similar recommendations.
	The following is from Supplement 2S-1	
5. RECORDS	3 RECORDS	
	3.1 Record Files	
A File of records of personnel qualification shall be established and maintained by the employer. Collection, storage, and control of records required by this Standard shall be in accordance with ANSI N45.2.9.	Records of personnel qualification shall be established and maintained by the employer. These records shall include the information required by para. 2.7 above.	Similar requirement.
ANSI N45.2.6 addresses the qualification of inspection and test personnel, as described above. For NDE activities, N45.2.6 refers to the use of SNT-TC-1A for qualification. Regulatory Guide-1.58 C-8. An important concept that is not addressed directly in ANSI N45.2.6-1978. ANST Recommended Practice No. SNT-TC-1A-1975, or the ASME Boiler and Pressure Vessel Code is that occupational radiation exposure should be maintained as low as is reasonable achievable (ALARA). In all cases where inspection, examination, and testing personnel may be exposed to radiation field during their activities in restricted areas, these personnel should receive instruction in radiation protection and radiation-dose-reduction considerations related to work they are expected to perform. Regulatory Guide 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable," describes techniques, features, and recommendations to maintain occupational exposures ALARA.	SUPPLEMENT 2S-2 Supplementary Requirements for the Qualification of Nondestructive Examination Personnel NQA-1-1994, Supplement 2S-2, Supplementary Requirements for the Qualification of Nondestructive Examination Personnel, subsection 2.1, requires application of Recommended Practice SNT-TC-1A, June 1980 Edition to NDE personnel. The company will implement the qualification program required by this supplement in accordance with the applicable standard for the facility's commitment to the ASME code or other applicable code governing the activity. This alternative is considered acceptable because other editions of this recommended practice or other national standards may be required by industry codes or regulations for qualification of NDE personnel	Exceptions and clarifications to NQA-1-1994, supplement 2S-1 defined.
	1 GENERAL	
	This Supplement provides amplified requirements for the	

CRITERION 2 ANSI N45.2-1977/N18.7-1976	BASIC REQUIREMENT 2 NQA-1 1994	COMMENTS
	qualification of personnel who perform radiographic (RT), magnetic particle (MT), ultrasonic (UT), liquid penetrant (PT), eddy current (ET), neutron radiographic (NRT), leak testing (LT), acoustic emission (AE), and visual testing (VT) [hereinafter referred to as nondestructive examination (NDE)] to verify conformance to specified requirements.	
	It supplements the requirements of Basic Requirement 2 of this Part (Part I) and shall be used in conjunction with that Basic Requirement when and to the extent specified by the organization invoking this Part (Part I).	
	2 CERTIFICATION	
	2.1 Applicable Documents	
	The American Society of Nondestructive Testing Recommended Practice No. SNT-TC-1A, December 1980 Edition, and its applicable supplements shall apply as requirements to NDE personnel covered by this Supplement.	Each standard invokes a different edition of SNT-TC-1A. The quality program should designate the specific edition the company will meet. It may be that we describe that as being specified in the implementing procedures and correspondence with the NRC (similar to changed ASME codes).
	2.2 Program	
	The responsible organization shall establish written procedures for the control and administration of NDE personnel training, examination, and certification.	
	2.3 Records	
	Records of personnel qualification shall be established and maintained by the employer.	
	SUPPLEMENT 2S-3 Supplementary Requirements for the Qualification of Quality Assurance Program Audit Personnel	ANSI N45.2.23 addresses the qualification of lead auditors. NQA-1-1994 is consistent with ANSI N45.2.23.
ANSI N45.2.23 addresses the qualification of lead auditor:		
This Standard provides requirements and guidance for the qualification of audit team leaders, henceforth identified as a "Lead Auditor", who organizes and directs audits, reports, audit findings, and evaluates corrective action.		

CRITERION 2 ANSI N45.2-1977/N18.7-1976	BASIC REQUIREMENT 2 NQA-1 1994	COMMENTS
This Standard also provides requirements and guidance for the qualifications of individuals, henceforth referred to as "Auditor", who participate in an audit, such as technical specialists, management representatives, and auditors-in-training.		
1.2 Applicability	1 GENERAL	N45.2.23 was a standalone document therefore repeats applicability and definitions defined in NQA-1-1994.
The requirements of this Standard apply to Auditors and Lead Auditors who perform audits for the plant owner, contractors, or other organizations participating in activities affecting the quality of structures, systems, and components of nuclear power plants which are subject to audit in accordance with requirements of ANSI N45.2. This Standard shall be used in conjunction with the requirements of ANSI N45.2.12.		
1.3 Responsibility		
The organization or organizations responsible for implementation of the applicable requirements of this standard shall be identified and the scope of their responsibilities and authorities shall be documented. 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. It is the responsibility of each of these organizations to comply with the practices and procedures so established and to conform with the applicable requirements of this Standard.		Responsibility is defined in the Introduction of NQA-1-1994, Section I-3.
1.4 Definitions		
The following definitions are provided to assure uniform understanding of selected terms as they are used in this Standard. Other terms and definitions are contained in ANSI N45.2.10.		NQA-1-1994 calls out in Supplement 2S-3-1 "General" what an "auditor" and "lead" auditor means rather than specific definitions.
1.4.1 <i>Auditor</i> . Any individual who performs any portion of an audit, including Lead Auditors, technical specialists, and others such as management representatives and auditors-in-training.		

<p align="center">CRITERION 2 ANSI N45.2-1977/N18.7-1976</p>	<p align="center">BASIC REQUIREMENT 2 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>1.4.2 <i>Lead Auditor</i>. An individual qualified to organize and direct an audit, report audit findings, and evaluate corrective action.</p>		
<p>1.4.3 <i>Audit</i>. A documented activity performed in accordance with written procedures or checklists to verify, by examination and evaluation of objective evidence, that applicable elements of the quality assurance program have been developed, documented, and effectively implemented in accordance with specified requirements. An audit should not be confused with surveillance or inspection for the sole purpose of process control or product acceptance.</p>	<p>audit - a planned and documented activity performed to determine by investigation, examination, or evaluation of objective evidence the adequacy of and compliance with established procedures, instructions, drawings, and other applicable documents, and the effectiveness of implementation. An audit should not be confused with surveillance or inspection activities performed for the sole purpose of process control or product acceptance. [from Part I – Introduction]</p>	<p>NQA-1 similar definition to ANSI N45.2.10.</p>
<p>1.5 Referenced Documents</p>		
<p>Documents that are referenced in this Standard are identified at the point of reference and described in Section 6 of this Standard REGULATORY POSITION RG 1.146 C1. Section 1.5 of ANSI/ASME N45.2.23-1978 states that documents that are referenced in this standard are identified at the point of reference and described in Section 6 of the standard. The specific applicability of these listed documents has been addressed in the latest revision of the following regulatory guides: ANSI Standard Regulatory Guide N45.2 1.28 N45.2.9 1.88 N45.2.10 1.74</p>		
<p>REGULATORY POSITION RG 1.146 C2. ANSI/ASME N45.2.23-1978 does not include the statement that is found in other N45.2 series standards excluding activities covered by ASME Boiler and Pressure Vessel Code Section III, Divisions 1 and 2, and Section XI from the requirements of the standard. The NRC staff considers that ANSI/ASME N45.2.23-1978 applies to these Code-covered activities where the ASME Code does not address the requirements covered by ANSI/ASME N45.2.23-1978.</p>		
<p>2. QUALIFICATIONS OF AUDITORS AND LEAD</p>		

CRITERION 2 ANSI N45.2-1977/N18.7-1976	BASIC REQUIREMENT 2 NQA-1 1994	COMMENTS
AUDITORS (ANSI N45.2.23)		
2.1 General This Section delineates the qualifications of Auditor and Lead Auditors.	This Supplement provides amplified requirements for the qualification of an audit team leader, henceforth identified as a Lead Auditor, who organizes and directs audits, reports audit findings, and evaluates corrective action.	
	This Supplement also provides amplified requirements for the qualifications of individuals, henceforth referred to as Auditors, who participate in an audit, such as technical specialists, management representatives, and auditors-in-training.	
	It supplements the requirements of Basic Requirement 2 of this Part (Part I) and shall be used in conjunction with that Basic Requirement when and to the extent specified by the organization invoking this Part (Part I).	
2.2 Qualification of Auditors	2 QUALIFICATION OF AUDITORS	
	2.1 Responsibility of Auditing Organization	
The responsible auditing organization shall establish the audit personnel qualifications and the requirements for the use of technical specialists to accomplish the auditing of the quality assurance programs	The responsible auditing organization shall establish the audit personnel qualifications and the requirements for the use of technical specialists to accomplish the auditing of quality assurance programs.	Similar requirements.
Personnel selected for quality assurance auditing assignments shall have experience or training commensurate with the scope, complexity, or special nature of the activities to be audited.	Personnel selected for quality assurance auditing assignments shall have experience or training commensurate with the scope, complexity, or special nature of the activities to be audited.	Similar requirements.
Auditors shall have, or be given, appropriate training or orientation to develop their competence for performing required audits.	Auditors shall have, or be given, appropriate training or orientation to develop their competence for performing required audits.	Similar requirements.
Competence of personnel for performance of the various auditing functions shall be developed by one or more of the following methods:	Competence of personnel for performance of the various auditing functions shall be developed by one or more of the methods given in (a) through (c) below:	Similar requirements.
2.2.1 Orientation to provide a working knowledge and understanding of ANSI B45.2, this Standard, and the auditing organization's procedures for implementing audits and reporting results.	(a) orientation to provide a working knowledge and understanding of this Part (Part I) and the auditing organization's procedures for implementing audits and reporting results;	Similar requirements.
2.2.2 Training programs to provide general and specialized training in audit performance.	(b) training programs to provide general and specialized training in audit performance.	Similar requirements.
General training shall include fundamentals, objectives, characteristics, organization, performance, and results of	General training shall include fundamentals, objectives, characteristics, organization, performance, and results of	Similar requirements.

CRITERION 2 ANSI N45.2-1977/N18.7-1976	BASIC REQUIREMENT 2 NQA-1 1994	COMMENTS
quality auditing..	quality auditing.	
Specialized training shall include methods of examining, questioning, evaluating, and documenting specific audit items and methods of closing out audit findings	Specialized training shall include methods of examining, questioning, evaluating, and documenting specific audit items and methods of closing out audit findings.	Similar requirements.
2.2.3 On-the-job training guidance, and counseling under the direct supervision of a Lead Auditor. Such training shall include planning, performing, reporting, and follow-up action involved in conducting audits.	(c) on-the-job training, guidance, and counseling under the direct supervision of a Lead Auditor. Such training shall include planning, performing, reporting, and follow-up action involved in conducting audits.	Similar requirements.
2.3 Qualification of Lead Auditors	3 QUALIFICATION OF LEAD AUDITORS	
An individual shall meet the requirements of paragraphs 2.3.1 through 2.3.5 prior to being designated a Lead Auditor.	An individual shall meet the requirements of para[graph]s 3.1 through 3.4 below prior to being designated a Lead Auditor	Similar requirements.
2.3.1 Education and Experience. The prospective Lead Auditor shall have verifiable evidence that a minimum of ten (10) credits under the following scoring system have been accumulated.		NQA-1-1994 does not require specific education and experience to the level described in N45.2.23, but has included this information in Appendix 2A-3, Non-mandatory Guidance on the Education and Experience of Lead Auditors. NQA-1 SUPPLEMENT 2S-4 (described below) meets the intent of this section.
2.3.1.1 <i>Education (4 credits maximum)</i> . Associate degree from an accredited institution score one (1) credit or if the degree is an engineering, physical sciences, mathematics, or quality assurance, score two (2) credits or, a bachelor degree from an accredited institution score two (2) credits or if the degree is in engineering, physical sciences, mathematics, or quality assurance, score three (3) credits; in addition score one (1) credit for a master degree in engineering, physical sciences, business management, or quality assurance from an accredited institution.		
2.3.1.2 <i>Experience (9 points maximum)</i> . Technical experience in engineering, manufacturing, construction, operation, or maintenance, score one (1) credit for each full year with a maximum of five (5) credits for this aspect of experience. If two (2) or more years of this experience have been in the nuclear field, score one (1) additional credit, or, if two (2) or more years of this experience have been in quality assurance, score two (2) additional credits, or, if two (2) or more years of this experience have been in auditing, score three (3) additional credits, or, if two (2) or more years of this experience have been in nuclear quality assurance, score three (3) additional credits, or, if two (2)		

CRITERION 2 ANSI N45.2-1977/N18.7-1976	BASIC REQUIREMENT 2 NQA-1 1994	COMMENTS
or more years of this experience have been in nuclear quality assurance auditing, score four (4) additional credits.		
2.3.1.3 <i>Other Credentials of Professional Competence (2 credits maximum)</i> . Certification of competency in engineering, science, or quality assurance specialties issued and approved by a State Agency, or National Professional or Technical Society, score two (2) credits.		
2.3.1.4 <i>Rights of Management (2 points maximum)</i> . The Lead Auditor's employer may grant up to two (2) credits for other performance factors applicable to auditing which may not be explicitly called out in this standard. Examples of these factors are leadership, sound judgment, maturity, analytical ability, tenacity, past performance, QA training courses.		
2.3.2 Communication Skill.	3.1 Communication Skills	
The prospective Lead Auditors shall have the capability to communicate effectively, both written and oral.	The prospective Lead Auditor shall have the capability to communicate effectively, both in writing and orally.	Similar requirements.
These skills shall be attested to in writing by the Lead Auditor's employer.	These skills shall be attested to in writing by the Lead Auditor's employer.	Similar requirements.
2.3.3 Training	3.2 Training	
Prospective Lead Auditors shall have training to the extent necessary to assure their competence in auditing skills.	Prospective Lead Auditors shall have training to the extent necessary to assure their competence in auditing skills.	Similar requirements.
Training in the following areas shall be given based upon management evaluation of the particular needs of each prospective Lead Auditor.	Training in the following areas shall be given based upon management evaluation of the particular needs of each prospective Lead Auditor.	Similar requirements.
2.3.3.1 Knowledge and understanding of ANSI N45.2, its associated Standards, particularly ANSI N45.2.12, and other nuclear-related codes, standards, regulations, regulatory guides, as applicable.	3.2.1 Knowledge and understanding of this Part (Part I) and other nuclear-related codes, standards, regulations, and regulatory guides, as applicable.	N45.2.23 called out details met by the statement in NQA-1 regarding the elements in NQA-1-1994, Part I.
2.3.3.2 General structure of quality assurance programs as a whole and applicable elements such as organization; design control; procurement document control; instructions; procedures and drawings; document control; control of purchased material equipment and services; identification and control of materials, parts and components; control of special processes; inspection; test control; control of measuring and test equipment;	3.2.2 General structure of quality assurance programs as a whole and applicable elements as defined in this Part (Part I).	N45.2.23 called out details met by the statement in NQA-1 regarding the elements in NQA-1-1994, Part I.

CRITERION 2 ANSI N45.2-1977/N18.7-1976	BASIC REQUIREMENT 2 NQA-1 1994	COMMENTS
handling, storage and shipping; inspection, test, and operating status; nonconforming materials, parts, or components; corrective action; quality assurance records; audits; and quality information feedback.		
2.3.3.3 Auditing techniques of examining, questioning, evaluating and reporting; methods of identifying and following up on corrective action items; and closing out audit findings.	3.2.3 Auditing techniques of examining, questioning, evaluating, and reporting; methods of identifying and following up on corrective action items; and closing out audit findings.	Similar requirements.
2.3.3.4 Audit planning in the quality-related functions for the following activities: design, purchasing, fabrication, handling, shipping, storage, cleaning, erection, installation, inspection, testing, statistics, nondestructive examination, maintenance, repair, operation, modification of nuclear facilities or associated components and safety aspects of the nuclear facility.	3.2.4 Audit planning in the quality-related functions for the following activities: siting, designing, purchasing, fabricating, handling, shipping, receiving, storing, cleaning, erecting, installing, inspecting, testing, operating, maintaining, repairing, refueling, modifying, and decommissioning of nuclear facilities or associated components, and safety aspects of the nuclear facility.	NQA-1 adds “siting”, “refueling” and “decommissioning” as the standard addresses construction.
2.3.3.5 On-the-job training to include the elements of audit activity as described in ANSI N45.2.12.	3.2.5 On-the-job training to include applicable elements of the audit program.	Similar requirement.
2.3.4 Audit Participation.	3.3 Audit Participation	
The prospective Lead Auditor shall have participated in a minimum of five (5) quality assurance audits within a period of time not to exceed three (3) years prior to the date of qualification, one audit of which shall be a nuclear quality assurance audit within the year prior to his qualification.	The prospective Lead Auditor shall have participated in a minimum of five (5) quality assurance audits within a period of time not to exceed 3 years prior to the date of qualification, one audit of which shall be a nuclear quality assurance audit within the year prior to his qualification.	Similar requirement.
2.3.5 Examination.	3.4 Examination	
The prospective Lead Auditor shall pass an examination which shall evaluate his comprehension of and ability to apply the body of knowledge identified in paragraph 2.3.3.	The prospective Lead Auditor shall pass an examination which shall evaluate his comprehension of and ability to apply the body of knowledge identified in para. 3.2 above.	Similar requirement.
The test may be oral, written, practical, or any combination of the three types.	The examination may be oral, written, practical, or any combination of the three types.	Similar requirement.
The development and administration of the examination shall be in accordance with Section 4 of this Standard.	The development and administration of the examination shall be in accordance with Section 5 of this Supplement.	Similar requirement.
3. MAINTENANCE OF QUALIFICATION	4 MAINTENANCE OF QUALIFICATION	
3.1 General		
The maintenance of proficiency established in this Section shall apply to the Lead Auditor only.		
3.2 Maintenance of Proficiency	4.1 Maintenance of Proficiency	

CRITERION 2 ANSI N45.2-1977/N18.7-1976	BASIC REQUIREMENT 2 NQA-1 1994	COMMENTS
Lead Auditors shall maintain their proficiency through one or more of the following: regular and active participation in the audit process; review and study of codes, standards, procedures, instructions, and other documents related to quality assurance programs and program auditing; participation in training programs.	Lead Auditors shall maintain their proficiency through one or more of the following: regular and active participation in the audit process; review and study of codes, standards, procedures, instructions, and other documents related to quality assurance program and program auditing; or participation in training program(s).	Similar requirement.
Based on management annual assessment, management may extend the qualification, require retraining, or require requalification.	Based on annual assessment, management may extend the qualification, require retraining, or require requalification.	Similar requirement.
3.3 Requalification	4.2 Requalification	
Lead Auditors who fail to maintain their proficiency for a period of two years or more shall require requalification.	Lead Auditors who fail to maintain their proficiency for a period of 2 years or more shall require requalification.	Similar requirement.
Requalification shall include retraining in accordance with the requirements of paragraph 2.3.3, reexamination in accordance with paragraph 2.3.5 and participation as an Auditor in at least one nuclear quality assurance audit.	Requalification shall include retraining in accordance with the requirements of para. 3.2 above, reexamination in accordance with para. 3.4 above, and participation as an Auditor in at least one nuclear quality assurance audit.	Similar requirement.
These evaluations shall be documented.	These evaluations shall be documented.	Similar requirement.
4. ADMINISTRATION	5 ADMINISTRATION	
4.1 Organizational Responsibility	5.1 Organizational Responsibility	
Training of auditors shall be the responsibility of the employer.	Training of auditors shall be the responsibility of the employer.	Similar requirement.
The responsible auditing organization shall select and assign personnel who are independent of any direct responsibility for performance of the activities which they will audit.	The responsible auditing organization shall select and assign personnel who are independent of any direct responsibility for performance of the activities which they will audit.	Similar requirement.
The Lead Auditor shall, prior to commencing the audit, concur that assigned personnel collectively have experience or training commensurate with the scope, complexity, or special nature of the activities to be audited.	The Lead Auditor shall, prior to commencing the audit, concur that assigned personnel collectively have experience or training commensurate with the scope, complexity, or special nature of the activities to be audited.	Similar requirement.
4.2 Qualification Examination	5.2 Qualification Examination	
The development and administration of the examination for Lead Auditor required by paragraph 2.3.5 is the responsibility of the employer.	The development and administration of the examination for a Lead Auditor required by para. 3.4 above is the responsibility of the employer.	Similar requirement.
The employer may delegate this activity to an independent certifying agency, but shall retain responsibility for conformance of the examination and its administration to this Standard.	The employer may delegate this activity to an independent certifying agency, but shall retain responsibility for conformance of the examination and its administration to this Part (Part I).	Similar requirement.

CRITERION 2 ANSI N45.2-1977/N18.7-1976	BASIC REQUIREMENT 2 NQA-1 1994	COMMENTS
Integrity of the examination shall be maintained by the employer or certifying agency through appropriate confidentiality of files and, where applicable, proctoring of examinations.	Integrity of the examination shall be maintained by the employer or certifying agency through appropriate confidentiality of files and, where applicable, proctoring of examinations.	Similar requirement.
Copies of the objective evidence regarding the type(s) and content of the examination(s) shall be retained by the employer in accordance with the requirements of Section 5.	Copies of the objective evidence regarding the type(s) and content of the examination(s) shall be retained by the employer in accordance with the requirements of Section 6 below.	Similar requirement.
5. RECORDS	6 RECORDS	
5.1 General	6.1 General	
Records of personnel qualifications for Auditors and Lead Auditors performing audits shall be established and maintained by the employer.	Records of personnel qualifications for Auditors and Lead Auditors performing audits shall be established and maintained by the employer.	Similar requirement.
5.2 Certification of Qualification	6.2 Certification of Qualification	
Each Lead Auditor shall be certified by his employer as being qualified to lead audits.	Each Lead Auditor shall be certified by his employer as being qualified to lead audits.	Similar requirement.
This certification shall, as a minimum, document the following:	This certification shall, as a minimum, document the following:	Similar requirement.
a) Employer's name	(a) employer's name:	
b) Lead Auditor's name	(b) Lead Auditor's name;	
c) Date of certification or recertification	(c) date of certification or recertification;	
d) Basis for qualification (i.e., education, experience, communication skills, training, examination, etc.)	(d) basis of qualification (i.e., education, experience, communication skills, training, examination, etc.);	
e) Signature of employers' designated representative who is responsible for such certification	(e) signature of employer's designated representative who is responsible for such certification.	
An example of a format for documenting the records of a Lead Auditor is given in Appendix A		Example not called out in NQA-1 but exists in standard as Non-Mandatory Appendix 2A-3
5.3 Updating of Lead Auditors' Records	6.3 Updating of Lead Auditors' Records	
Records for each Lead Auditor shall be maintained and updated annually.	Records for each Lead Auditor shall be maintained and updated annually.	Similar requirement.
5.4 Record Retention		
Qualification records shall be retained as required by ANSI N45.2.12 and maintained as required by ANSI N45.2.9.		Records requirements are addressed in Basic and Supplemental requirements (Section 17) of NQA-1-1994.
	SUPPLEMENT 2S-4 Supplementary Requirements for Personnel Indoctrination and Training	This Supplement of NQA-1-1994 is met in conjunction with applicable ANSI N18.1 and/or ANS-3.1

CRITERION 2 ANSI N45.2-1977/N18.7-1976	BASIC REQUIREMENT 2 NQA-1 1994	COMMENTS
		standards.
	1 GENERAL	
	This Supplement provides amplified requirements for the indoctrination and training of personnel performing or managing activities affecting quality.	
	It supplements the requirements of Basic Requirement 2 of this Part (Part I) and shall be used in conjunction with that Basic Requirement when and to the extent specified by the organization invoking this Part (Part I).	NQA-1, SUPPLEMENT 2S-4, describes indoctrination and training requirements that meet the intent of those stated in ANSI N45.2.23.
	2 APPLICABILITY	
	This Supplement applies to personnel performing or managing activities affecting quality. Personnel to be indoctrinated or trained shall be identified.	
	The extent of indoctrination and training shall be commensurate with the following:	
	(a) the scope, complexity, and nature of the activity; and	
	(b) the education, experience, and proficiency of the person.	
	Activities affecting quality include siting, designing, purchasing, fabricating, handling, shipping, receiving, storing, cleaning, erecting, installing, inspecting, testing, operating, maintaining, repairing, refueling, modifying, and decommissioning.	
	3 INDOCTRINATION	
	Personnel shall be indoctrinated in the following subjects as they relate to a particular function: (a) general criteria, including applicable codes, standards, and company procedures; (b) applicable quality assurance program elements; and (c) job responsibilities and authority.	
	4 TRAINING	
	Training shall be provided, if needed, to: (a) achieve initial proficiency; (b) maintain proficiency; and (c) adapt to changes in technology, methods, or job responsibilities.	
	5 RECORDS	
	Records of the implementation of indoctrination and	

CRITERION 2 ANSI N45.2-1977/N18.7-1976	BASIC REQUIREMENT 2 NQA-1 1994	COMMENTS
	training may take the form of: (a) attendance sheets; (b) training logs; or (c) personnel training records.	

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
N45.2, § 4.1 General		
N45.2 Measures shall be established and documented to assure that the applicable specified design requirements, such as design bases, regulatory requirements, codes, and standards are correctly translated into specifications, drawings, procedures, or instructions.	The design shall be defined, controlled, and verified. Applicable design inputs shall be appropriately specified on a timely basis and correctly translated into design documents.	Similar requirements.
	Design interfaces shall be identified and controlled.	Addressed in later parts of N45.2.11.
	Design adequacy shall be verified by persons other than those who designed the item.	Addressed in later parts of N45.2.11.
	Design changes, including field changes, shall be governed by control measures commensurate with those applied to the original design.	Addressed in later parts of N45.2.11.
N45.2.11 § 2. Program Requirements		
2.1 Establishment and Documentation A quality assurance program for design shall be established and documented to comply with the requirements of this Standard. The program documents shall define the organizational structure within which the program is to be implemented, and shall delineate the authority and responsibility of the persons and organizations involved performing design activities affecting the quality of design. The program documents shall identify the items and services and the specific activities to which this standard is applied. The design responsibilities and interfaces among the contributing organizations, both internal and external, should be identified. Provisions should be made in the program for periodic audits, review, and evaluation of the effectiveness of the program in achieving quality objectives. Correction of deficiencies shall be an integral part of the program.	This subsection is covered by NQA-1, Requirements 1 and 2 and is not repeated in criterion 3	NQA-1 does not repeat information from other criteria as in the ANSI standards.
N45.2.11, § 2.2 Program Procedures Procedures shall be employed to assure that design activities are carried out in a planned, controlled, orderly and correct manner. Program procedures shall cover the following as applicable: 1. Responsibilities of organizations involved in the program, such as owner, A-E, NSSS supplier and other	NOTE: Program procedure requirements have been incorporated into multiple sections of NQA-1 and are not generally repeated for specific programs. 1. and 2. Responsibilities of organizations is addressed in Basic Requirement 1 and Supplement 1S-1. 3. Interface control is addressed in Supplements 1S-1 and 3S-1.	NQA-1 does not repeat information from other criteria as in the ANSI standards. Additional standards and NRC Regulatory Guides also provide information on many of these program requirements.

<p align="center">CRITERION 3 ANSI N45.2; N45.2.11; and N18.7</p>	<p align="center">BASIC REQUIREMENT 3 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>contractors.</p> <p>2. Responsibilities within design organizations.</p> <p>3. Technical information exchanges across external and internal interfaces.</p> <p>4. Document control including review, approval, release, distribution, and revision.</p> <p>5. Maintenance and retention of design documents.</p> <p>6. Management review of status and adequacy of program.</p> <p>7. Necessary training of personnel performing activities covered by this standard.</p> <p>8. Identifying appropriate design input.</p> <p>9. Preparation of design documents.</p> <p>10. Specifying quality levels, acceptance standards, and record requirements.</p> <p>11. Performance of design verifications.</p> <p>12. Conducting audits of design activities, their reporting and follow-up.</p> <p>13. Taking corrective action (see Section 9).</p> <p>14. Making experience reports available to cognizant design personnel.</p> <p>15. Controlling design changes.</p> <p>16. Other procedures as required by this standard.</p>	<p>4. Document control is addressed in Basic Requirement 6 and Supplement 6S-1.</p> <p>5. Maintenance of design documents is addressed under document control and retention is addressed in basic requirement 17 and Supplement 17S-1.</p> <p>6. Management review of the program is addressed under Basic Requirement 2.</p> <p>7. Training requirements are addressed in Basic Requirement 2.</p> <p>8. Design input is addressed in Basic Requirement 3 and Supplement 3S-1.</p> <p>9. Preparation of design documents is addressed in Basic Requirement 3 and Supplement 3S-1.</p> <p>10. Specifying quality levels is addressed in Basic Requirement 2. Specifying acceptance standards is addressed in Basic Requirements 3, 5, 10, and 11 with associated Supplements. Records requirements are addressed in Supplement 3S-1 and Basic Requirement 17 and Supplement 17S-1.</p> <p>11. Design verification is addressed in Supplement 3S-1.</p> <p>12. Audits is addressed in Basic Requirement 18 and Supplement 18S-1.</p> <p>13. Corrective Action is addressed in Basic Requirements 15 and 16 and their associated Supplements.</p> <p>14. Experience reports (operating experience included) are not addressed to any significant degree in NQA-1 related to design.</p> <p>15. Change control is addressed in Supplement 3S-1.</p> <p>16. Other procedures may be addressed throughout NQA-1 in addition to Supplement 3S-1.</p>	
<p>N45.2.11, § 2.3 Factors Considered</p> <p>Some of the factors to be considered in establishing the program include:</p> <p>1. Nature of the organization such as the plant owner, manufacturer, or architect-engineer, and the nature of the design interfaces among them.</p> <p>2. Importance of the design activity to plant safety.</p> <p>3. State of the art such as experimental, developmental, or</p>	<p>These factors are generally addressed as principles throughout the standards of NQA-1.</p> <p>A similar list of factors to consider is contained as nonmandatory guidance in Appendix 3A-1.</p>	<p>Not requirements.</p>

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
standard design. 4. Nature of design activity such as conceptual, preliminary, detailed design, or field engineering.		
N45.2.11 § 1 Introduction 1.1 Scope This standard provides requirements and guidance for a quality assurance program for the design of nuclear power plant structures, systems and components whose satisfactory and reliable performance is required: 1. To prevent accidents that could cause undue risk to the health and safety of the public; or 2. To mitigate the consequences of such accidents if they were to occur.	See NQA-1-1994, Part 1, Introduction , for Purpose and Applicability.	
	SUPPLEMENT 3S-1 SUPPLEMENTARY REQUIREMENTS FOR DESIGN CONTROL	
	1 GENERAL	
	This Supplement provides amplified requirements for design control.	
N45.2.11 § 1.1 - The requirements of this standard may also be extended to other structures, systems and components in whole or in part as specified by the purchaser. This standard covers activities which affect the final design. This standard is intended to be used in conjunction with ANSI N45.2.	It supplements the requirements of Basic Requirement 3 of this Part and shall be used in conjunction with that Basic Requirement when and to the extent specified by the organization invoking this Part.	Similar statement regarding use to the extent specified by the purchaser (organization invoking this Part)
N45.2.11 § 1.2 Applicability		
This standard applies to the plant owner, nuclear steam supply system (NSSS) designer, architect engineer or plant designer, and other organizations participating in design activities affecting quality of items covered by this standard. The extent to which the individual sections and elements of this standard are applied will depend upon factors such as the nature and scope of the work to be performed and the importance of the structures, systems and components to safe plant operation. The ASME Boiler and Pressure Vessel Code (Hereafter referred to as the Code) as well as other ANSI Standards,	See NQA-1-1994, Part 1, Introduction , for Applicability and Responsibility.	Similar applicability established between the standards.

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
<p>has been considered in the development of this standard, and this standard is intended to be compatible with their requirements.</p> <p>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.</p>		
<p>N45.2.11 § 1.3 Responsibility</p>		
<p>It is the responsibility of the plant owner to provide for the establishment and execution of a quality assurance program for the plant design consistent with the provisions of this standard. The plant owner may delegate to other organizations the work of establishing and executing the quality assurance program, or any part thereof, but shall retain responsibility for overall program effectiveness. It is the responsibility of the plant owner and other organizations invoking this standard to identify the structures, systems and components, and to specify the extent to which the provisions of this standard apply to such structures, systems and components. In no way shall the program operate to diminish the responsibility of any contractor for the quality of services furnished.</p>	<p>See NQA-1-1994, Part 1, Introduction, for Applicability and Responsibility.</p>	<p>Similar responsibilities exist between the standards.</p>
<p>N45.2.11 § 1.4 Definitions</p>		
<p>The following definitions are provided to assure a uniform understanding of select terms as they are used in this standard.</p>	<p>Note that the below definitions are copied from the introduction to Part I of NQA-1.</p>	<p>Definitions are contained in NQA-1-1994, Part I, Introduction, § 4 Terms and Definitions</p>
<p>Design - Technical and management processes which commence with identification of design input and which lead to and include the issuance of design output documents.</p>	<p>Design process – technical and management processes that commence with identification of design input and that lead to and include the issuance of design output documents</p>	<p>Similar definition.</p>
<p>Design Input - Those criteria, parameters, bases or other design requirements upon which detailed final design is based.</p>	<p>Design input – those criteria, parameters, bases, or other design requirements upon which detailed final design is based</p>	<p>Similar definition.</p>
<p>Design Output - Documents such as drawings, specifications and other documents defining technical requirements of structures, systems and components as delineated in Section 4.</p>	<p>Design output – drawings, specifications, and other documents used to define technical requirements of structures, systems, components, and computer programs</p>	<p>Similar definition.</p>
<p>External Design Interface - Relationship between design groups from different companies. Examples are the</p>		<p>Design interface is not defined in NQA-1, but controls for interface are</p>

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
interfaces between the plant owner and the architect engineer or the plant owner and the NSSS supplier, or the architect engineer and the NSSS supplier.		described in Supplement 3S-1, § 6 Interface Control
Final Design - Approved design output documents and approved changes thereto.	Design, final – approved design output documents and approved changes thereto	Similar definition.
Internal Design Interface - Relationship between design groups or organizations within a company.		Design interface is not defined in NQA-1, but controls for interface are described in Supplement 3S-1, § 6 Interface Control
Procedures - A document that specifies or describes how an activity is to be performed. It may include methods to be employed, equipment or materials to be used and sequence of operations.	Procedure – a document that specifies or describes how an activity is to be performed	Similar definition.
	Design change – any revision or alteration of the technical requirements defined by approved and issued design output documents and approved and issued changes thereto	New definition not previously in N45.2.11.
N45.2.11, § 1.5 Referenced Documents Other documents that are required to be included as part of this standard will be identified at the point of reference and described in Section 12 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 12 of this standard. NRC Reg. Guide 1.64, Reg. Position C.1 indicates that the specific acceptability of these listed documents has been or will be covered separately in other regulatory guides or in Commission regulations where appropriate.		Applicability of other standards and Regulatory Guides is addressed in Appendix C of the new QAPD.
N45.2.11, § 3. Design Input Requirements	2 DESIGN INPUT	
3.1 General Applicable design inputs, such as design bases, regulatory requirements, codes and standards, shall be identified, documented and their selection reviewed and approved.	Applicable design inputs, such as design bases, performance requirements, regulatory requirements, codes, and standards, shall be identified and documented, and their selection reviewed and approved by the responsible design organization.	Similar requirement.
The design input should be specified on a timely basis and to the level of detail necessary to permit the design activity to be carried out in a correct manner and to provide a consistent basis for making design decisions, accomplishing design verification measures, and	The design input shall be specified and approved on a timely basis and to the level of detail necessary to permit the design activity to be carried out in a correct manner and to provide a consistent basis for making design decisions, accomplishing design verification measures, and	Similar requirement.

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
evaluating design changes.	evaluating design changes.	
<p>N45.2 Changes or deviations from specified design requirements or quality standards shall be identified, documented, and controlled.</p> <p>N45.2.11 §3.1, ¶ 1 - Changes from specified design inputs including the reasons for the changes shall be identified, approved, documented and controlled.</p>	Changes from approved design inputs, including the reason for the changes, shall be identified, approved, documented, and controlled.	Similar requirement.
<p>N45.2.11 § 3.2 Requirements</p> <p>The design input shall include but is not limited to the following, where applicable:</p> <ol style="list-style-type: none"> 1. Basic functions of each structure, system and component. 2. Performance requirements such as capacity, rating, system output. 3. Codes, standards, and regulatory requirements including the applicable issue and/or addenda. 4. Design conditions such as pressure, temperature, fluid chemistry and voltage. 5. Loads such as seismic, wind, thermal and dynamic. 6. Environmental conditions anticipated during storage, construction and operation such as pressure, temperature, humidity, corrosiveness, site elevation, wind direction, nuclear radiation, electromagnetic radiation and duration of exposure. 7. Interface requirements including definition of the functional and physical interfaces involving structures, systems and components. 8. Material requirements including such items as compatibility, electrical insulation properties, protective coating and corrosion resistance. 9. Mechanical requirements such as vibration, stress, shock and reaction forces. 10. Structural requirements covering such items as equipment foundations and pipe supports. 11. Hydraulic requirements such as pump net positive suction heads (NPSH), allowable pressure drops, and allowable fluid velocities. 12. Chemistry requirements such as provisions for sampling and limitations on water chemistry. 		The detailed list of design input requirements has been moved to (and expounded upon as nonmandatory guidance in) NQA-1, Appendix 3A-1.

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
<p>13. Electrical requirements such as source of power, voltage, raceway requirements, electrical insulation and motor requirements.</p> <p>14. Layout and arrangement requirements.</p> <p>15. Operational requirements under various conditions, such as plant startup, normal plant operation, plant shutdown, plant emergency, operation, special or infrequent operation, and system abnormal or emergency operation.</p> <p>16. Instrumentation and control requirements including indicating instruments, controls and alarms required for operation, testing, and maintenance. Other requirements such as the type of instrument, installed spares, range of measurement, and location of indication should also be included.</p> <p>17. Access and administrative control requirements for plant security.</p> <p>18. Redundancy, diversity and separation requirements of structures, systems and components.</p> <p>19. Failure effects requirements of structures, systems and components, including a definition of those events and accidents which they must be designed to withstand.</p> <p>20. Test requirements including in-plant tests and the conditions under which they will be performed.</p> <p>21. Accessibility, maintenance, repair and inservice inspection requirements for the plant including the conditions under which these will be performed.</p> <p>22. Personnel requirements and limitations including the qualification and number of personnel available for plant operation, maintenance, testing and inspection and permissible personnel radiation exposures for specified areas and conditions.</p> <p>23. Transportability requirements such as size and shipping weight, limitations, I.C.C. regulations.</p> <p>24. Fire protection or resistance requirements.</p> <p>25. Handling, storage and shipping requirements.</p> <p>26. Other requirements to prevent undue risk to the health and safety of the public.</p> <p>27. Materials, processes, parts and equipment suitable for</p>		

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
application. 28. Safety requirements for preventing personnel injury including such items as radiation hazards, restricting the use of dangerous materials, escape provisions from enclosures, and grounding of electrical systems.		
N45.2.11, § 4. Design Process	3 DESIGN PROCESS	
Design activities shall be prescribed and accomplished in accordance with procedures of a type sufficient to assure that applicable design inputs are correctly translated into specifications, drawings, procedures or instructions. N45.2.11 § 4.1, ¶ 2 - The design activities may be prescribed in job specifications, work-instructions, planning sheets, procedure manuals, test procedures, or any other type of written form, which provides adequate control and permits reviewing, checking or verifying the results of the activity, by personnel who are experienced in the subject activity.	The responsible design organization shall prescribe and document the design activities on a timely basis and to the level of detail necessary to permit the design process to be carried out in a correct manner, and to permit verification that the design meets requirements. Design documents shall be adequate to support facility design, construction, and operation.	Similar requirement.
ANSI N45.2 These measures shall include provisions to assure that appropriate quality standards are specified and included or referenced in design documents. N45.2.11 § 4.1, ¶ 1 - Appropriate quality standards shall be identified, documented and their selection reviewed and approved.	Appropriate quality standards shall be identified and documented, and their selection reviewed and approved.	Similar requirement.
N45.2.11 § 4.1, ¶ 1 - Changes from specified quality standards including reasons for the changes shall be identified, approved, documented and controlled.	Changes from specified quality standards, including the reasons for the changes, shall be identified, approved, documented, and controlled.	Similar requirement.
N45.2 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 function of the structure, system, or component.	Design methods, materials, parts, equipment, and processes that are essential to the function of the structure, system, or component shall be selected and reviewed for suitability of application.	Similar requirement.
	Applicable information derived from experience, as set forth in reports or other documentation, shall be made available to cognizant design personnel.	Reference ANSI N45.2.11, § 2.2, Item 14 regarding experience.

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
<p>N45.2.11 § 4.1, ¶ 3 - Methods shall provide for relating the final design back to the source of design input. This traceability shall be documented in accordance with the requirements of Section 10.</p> <p>N45.2.11 § 4.1, ¶ 4 - The design activities shall be documented in sufficient detail to permit verification and auditing as required by this standard.</p>	<p>The final design (approved design output documents and approved changes thereto) shall:</p> <p>(a) be relatable to the design input by documentation in sufficient detail to permit design verification; and</p> <p>(b) identify assemblies and/or components that are part of the item being designed. When such an assembly or component part is a commercial grade item that, prior to its installation, is modified or selected by special inspection and/or testing to requirements that are more restrictive than the Supplier's published product description, the component part shall be represented as different from the commercial grade item in a manner traceable to a documented definition of the difference.</p>	<p>Similar requirement.</p> <p>New information regarding assemblies and component parts.</p>
<p>N45.2.11, § 4.2, Design Analyses</p>	<p>3.1 Design Analyses</p>	
<p>Design analyses such as physics, stress, thermal, hydraulic and accident, shall be performed in a planned, controlled and correct manner.</p>	<p>Design analyses shall be performed in a planned, controlled, and documented manner.</p>	<p>Similar requirement. Examples removed from NQA-1.</p>
<p>N45.2.11, § 4.2, ¶ 2 - Design analysis shall be legible and be in a form suitable for reproduction, filing and retrieving.</p>	<p>Design analysis documents shall be legible and in a form suitable for reproduction, filing, and retrieval.</p>	<p>Similar requirement.</p>
<p>N45.2 Design control measures shall provide for design analyses, such as physics, stress, thermal, hydraulic, accident; compatibility of materials; accessibility for inservice inspection, maintenance, and repair; and delineation of acceptance criteria for inspections and tests.</p> <p>N45.2.11, § 4.2, ¶ 2 - Analyses shall be sufficiently detailed as to purpose, method, assumptions, design input, references and units such that a person technically qualified in the subject can review and understand the analyses and verify the adequacy of the results without recourse to the originator.</p>	<p>They shall be sufficiently detailed as to purpose, method, assumptions, design input, references, and units such that a person technically qualified in the subject can review and understand the analyses and verify the adequacy of the results without recourse to the originator.</p>	<p>Similar requirement. Examples removed from NQA-1.</p>
<p>N45.2.11, § 4.2, ¶ 2 - Calculations shall be identified by subject (including structure, system, or component to which the calculation applies) originator, reviewer and date or by other data such that the calculations are retrievable.</p>	<p>Calculations shall be identifiable by subject (including structure, system, or component to which the calculation applies), originator, reviewer, and date; or by other data such that the calculations are retrievable.</p>	<p>Similar requirement.</p>
	<p>(a) Computer programs may be utilized for design analysis without individual verification of the program for each application provided:</p>	<p>NQA-1 provides additional controls on use of computer programs for design analyses.</p>
	<p>(1) the computer program has been verified to show that it</p>	

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
	produces correct solutions for the encoded mathematical model within defined limits for each parameter employed; and	
	(2) the encoded mathematical model has been shown to produce a valid solution to the physical problem associated with the particular application.	
	Computer programs shall be controlled to assure that changes are documented and approved by authorized personnel.	
	Where changes to previously verified computer programs are made, verification shall be required for the change, including evaluation of the effects of these changes on (1) and (2) above.	
N45.2.11, § 4.2, ¶ 2 - Procedures shall include requirements for: 1. Identifying documents to permit ready reference and retrieval. 2. Defining the objective of the analyses. 3. Definition of design inputs and their sources. 4. Documenting the results of literature searches or other applicable background data. 5. Documenting assumptions, and identifying those assumptions that must be verified as the design proceeds. 6. Identification of computer calculations, including computer type, code or programming, inputs and outputs. 7. Review and approval.	(b) Documentation of design analyses shall include (1) through (6) below: (1) definition of the objective of the analyses; (2) definition of design inputs and their sources; (3) results of literature searches or other applicable background data; (4) identification of assumptions and indication of those that must be verified as the design proceeds; (5) identification of any computer calculation, including computer type, computer program (e.g., name), revision identification, inputs, outputs, evidence of or reference to computer program verification, and the bases (or reference thereto) supporting application of the computer program to the specific physical problem; (6) review and approval.	Similar requirement. For N45.2.11, item 1, the identification of documents is addressed under NQA-1, Supplement 17S-1.
N45.2.11, § 4.3 Drawings		Requirements for control of documents (i.e. drawings) is addressed in Basic Requirement 6. Specific information regarding drawings is contained as non-mandatory guidance in NQA-1, Appendix 3A-1, § 3(a).

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
N45.2.11, § 4.4 Specifications		Requirements for control of documents (i.e. specifications) is addressed in Basic Requirement 6. Specific information regarding specifications is contained as non-mandatory guidance in NQA-1, Appendix 3A-1, § 3(b).
N45.2.11, § 4.5 Other Design Documents		Requirements for procedures is addressed in Basic Requirement 5. Requirements for control of documents (i.e. drawings) is addressed in Basic Requirement 6. Specific information regarding other design documents is contained as non-mandatory guidance in NQA-1, Appendix 3A-1, § 3(b). NQA-1, Appendix 3A-1, § 3(c) provides guidance on information that design documents should include to support facility operation.
N45.2 § 4.3 Design Verification N45.2.11 § 6. Design Verification	4 DESIGN VERIFICATION	
N45.2 Design control measures shall be applied to verify or check the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. N45.2.11, § 6.1 General Measures shall be applied to verify the adequacy of design. Design verification is the process of reviewing, confirming, or substantiating the design by one or more methods to provide assurance that the design meets the specified design inputs.	Design control measures shall be applied to verify the adequacy of design, such as by one or more of the following: the performance of design reviews, the use of alternate calculations, or the performance of qualification tests.	Similar requirement.
	Verification of computer programs shall include appropriate testing.	NQA-1-1994 Additional requirement to cover computer programs used in design.
N45.2 The responsible design organization shall identify the particular design verification methods utilized.	The responsible design organization shall identify and document the particular design verification method(s)	Similar requirement.

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
	used.	
	The results of design verification shall be clearly documented with the identification of the verifier clearly indicated.	Additional requirement for NQA-1-1994.
<p>N45.2 The verifying or checking process shall be performed by individuals or groups other than those who perform the original design but who may be from the same organization.</p> <p>N45.2.11, § 6.1, ¶ 2 Design verification shall be performed by any competent individuals or groups other than those who performed the original design but who may be from the same organization.</p>	Design verification shall be performed by any competent individual(s) or group(s) other than those who performed the original design but who may be from the same organization.	Similar requirement.
<p>N45.2.11, § 6.1, ¶ 2 This verification may be performed by the originator's supervisor provided the supervisor did not specify a singular design approach, or rule out certain design considerations and did not establish the design inputs used in the design, or if the supervisor is the only individual in the organization competent to perform the verification.</p> <p>NRC Reg, Guide 1.64, Reg. Position C.2 states to replace the above sentence with the following: "The duties of a 'supervisor' and the relationship with subordinates varies widely in different organizations. Regardless of their title, individuals performing design verification should not (1) have immediate supervisory responsibility for the individual performing the design, (2) have specified a singular design approach, (3) have ruled out certain design considerations, or (4) have established the design inputs for the particular design aspect being verified. While design verification by the designer's immediate supervisor is encouraged, it should not be construed that such verification constitutes the required independent design verification, nor should the independent design verification be construed to dilute or replace the clear responsibility of supervisors for the quality of work performed under their supervision."</p> <p>MPS QATR alternative states: "the Regulatory position</p>	This verification may be performed by the originator's supervisor, provided the supervisor did not specify a singular design approach or rule out certain design considerations and did not establish the design inputs used in the design or, provided the supervisor is the only individual in the organization competent to perform the verification.	NQA-1 addresses the NRC statement and encompasses the MPS and VA QATR alternatives. NRC Reg. Guide 1.64 has been withdrawn with endorsement of NQA-1 through Reg. Guide 1.28.

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
<p>states, in part, "It should not be construed that such verification constitutes the required independent design verification." The licensee has developed the following alternative to allow for adequate independent design verification:</p> <ul style="list-style-type: none"> • This review may be performed by the originator's Supervisor, only if the Supervisor: <ul style="list-style-type: none"> • Did not specify a singular design approach; • Did not establish the design inputs or did not rule out certain Design considerations; • Is the only individual in the organization competent to perform the review. <p>Where the Supervisor performs the design review, the next level of management shall fulfill the Supervisor's responsibilities.</p> <p>VA QATR alternative states: "With regard to Paragraph C.2(1) of Regulatory Guide 1.64: If in an exceptional circumstance the designer's immediate Supervisor is the only technically qualified individual available, this review may be conducted by the Supervisor, providing that: (a) the other provisions of the Regulatory Guide are satisfied, and (b) the justification is individually documented and approved in advance by the Supervisor's management, and (c) Nuclear Oversight audits cover frequency and effectiveness of use of Supervisors as design verifiers to guard against abuse."</p>		
<p>N45.2.11, § 6.1, ¶ 2 Cursory supervisory reviews do not satisfy the intent of this standard.</p>	<p>Cursory supervisory reviews do not satisfy the intent of this Part.</p>	<p>Similar statement.</p>
<p>N45.2 The depth of review can range from a detailed check of the complete design to a limited check of such things as the design approach and the results obtained in the original design.</p> <p>N45.2.11, § 6.1, ¶ 2 Design verification may vary from spot checking of calculations to actual tests in the field.</p>		<p>Not a requirement.</p>
	<p>Verification shall be performed in a timely manner.</p>	<p>Additional requirement.</p>
	<p>Design verification, for the level of design activity</p>	<p>Additional requirement.</p>

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
	<p>accomplished, shall be performed prior to release for procurement, manufacture, construction, or release to another organization for use in other design activities except in those cases where this timing cannot be met, such as when insufficient data exist. In those cases, the unverified portion of the design shall be identified and controlled.</p>	
	<p>In all cases the design verification shall be completed prior to relying upon the component, system, structure, or computer program to perform its function.</p>	<p>Additional requirement.</p>
<p>N45.2.11, § 6.2 Extent</p>	<p>4.1 Extent of Design Verification</p>	
<p>The extent of the design verification required is a function of the importance to safety of the item under consideration, the complexity of the design, the degree of standardization, the state-of-the-art, and the similarity with previously proven designs.</p>	<p>The extent of the design verification required is a function of the importance to safety, the complexity of the design, the degree of standardization, the state of the art, and the similarity with previously proven designs.</p>	<p>Similar requirement.</p>
<p>N45.2.11, § 6.2, ¶ 1 Where the design of a particular structure, system, or component for a particular nuclear power plant has been subjected to a verification process in accordance with this standard, the verification process need not be duplicated for identical designs.</p>	<p>Where the design has been subjected to a verification process in accordance with this Part, the verification process need not be duplicated for identical designs.</p>	<p>Similar requirement.</p>
<p>N45.2 Regardless of the degree of standardization or similarity to previously proven designs, the applicability of standardized or previously proven designs with respect to meeting pertinent design requirements shall be verified for each application. N45.2.11, § 6.2, ¶ 1 However, the applicability of standardized or previously proven designs, with respect to meeting pertinent design inputs, including environmental conditions, shall be verified for each application.</p>	<p>However, the applicability of standardized or previously proven designs, with respect to meeting pertinent design inputs, shall be verified for each application.</p>	<p>Similar requirement.</p>
<p>N45.2.11, § 6.2, ¶ 1 However, known problems affecting the standardized design and their effects on other features shall be considered.</p>	<p>Known problems affecting the standard or previously proven designs and their effects on other features shall be considered.</p>	<p>Similar requirement.</p>
<p>N45.2.11, § 6.2, ¶ 1 The original design and associated verification measures</p>	<p>The original design and associated verification measures shall be adequately documented and referenced in the files</p>	<p>Similar requirement.</p>

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
shall, however, be adequately documented and referenced in the files of subsequent application of the design.	of subsequent application of the design.	
N45.2.11, § 6.2, ¶ 2 Where changes to previously verified designs have been made, design verification shall be required for the changes, including evaluation of the effects of those changes on the overall design.	Where changes to previously verified designs have been made, design verification shall be required for the changes, including evaluation of the effects of those changes on the overall design and on any design analyses upon which the design is based that are affected by the change to previously verified design.	Similar requirement, but added clarification to check impacts from a change on other design analyses.
N45.2.11, § 6.3 Methods	4.2 Methods	
N45.2 Verifying or checking should consist of, as a minimum, reviewing the design, spot-checking the calculations or analyses, and assessing the results against the original design bases and functional requirements. N45.2.11, § 6.3, ¶ 1 The responsible design organization shall identify and document the particular design verification methods to be used. Acceptable verification methods include but are not limited to: 1. Design reviews– 2. Alternate calculations– 3. Qualification testing–	Acceptable verification methods include, but are not limited to, any one or a combination of the following: design reviews, alternate calculations, and qualification testing.	Similar requirement.
N45.2.11, § 6.3.1 Design Reviews	4.2.1 Design Reviews.	
N45.2 There are many ways of performing design reviews, and various depths of reviews may be required depending upon the importance and complexity of the design being reviewed, the degree of standardization, the state-of-the-art, and the similarity with previously proven designs. N45.2 The methods for design review can range from a formalized, multi-organization review to an informal, single-person review. N45.2.11, § 6.3.1, ¶ 1 Design reviews are critical reviews to provide assurance that design documents such as drawings, calculations, analyses or specifications are correct and satisfactory. Design reviews can range from multi-organization reviews to single-person reviews. The depth of review can range from a detailed check of the complete design to a limited check of such things as the design approach and the results	These are critical reviews to provide assurance that the final design is correct and satisfactory.	Not a requirement.

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
<p>obtained. The results of the review shall be documented and measures taken to ensure that the findings are implemented. Whether the review is conducted by one individual or a multi-organization there are a number of basic questions that shall be addressed such as:</p>		
<p>N45.2.11, § 6.3.1 – Lists the following 19 items to consider in the design review.</p>	<p>Where applicable, (a) through (f) below shall be addressed.</p>	<p>Similar requirement.</p>
<p>1. Were the inputs correctly selected and incorporated into design? (See paragraph 3.2).</p>	<p>(a) Were the design inputs correctly selected?</p>	<p>Similar requirement.</p>
<p>2. Are assumptions necessary to perform the design activity adequately described and reasonable, where necessary, are the assumptions identified for subsequent re-verifications when the detailed design activities are completed?</p>	<p>(b) Are assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?</p>	<p>Similar requirement.</p>
<p>7. Was an appropriate design method used?</p>	<p>(c) Was an appropriate design method used?</p>	<p>Similar requirement.</p>
<p>3. Are the appropriate quality and quality assurance requirements specified? 4. Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified and are their requirements for design met? 5. Have applicable construction and operating experience been considered? 9. Are the specified parts, equipment, and processes suitable for the required application? 10. Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed? 11. Have adequate Maintenance features and requirements been specified? 12. Are accessibility and other design provisions adequate for performance of needed maintenance and repair? 13. Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life? 14. Has the design properly, considered radiation exposure to the public and plant personnel? 15. Are the acceptance criteria incorporated in the design</p>	<p>(d) Were the design inputs correctly incorporated into the design?</p>	<p>Multiple questions in N45.2.11 related to incorporating design inputs into the design combined into one question on design inputs for NQA-1-1994.</p>

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
documents sufficient to allow verification that design requirements have been satisfactorily accomplished? 16. Have adequate preoperational and subsequent periodic test requirements been appropriately specified? 17. Are adequate handling, storage, cleaning and shipping requirements specified?		
8. Is the output reasonable compared to inputs?	(e) Is the design output reasonable compared to design inputs?	Similar requirement.
6. Have the design interface requirements been satisfied?	(f) Are the necessary design input and verification requirements for interfacing organizations specified in the design documents or in supporting procedures or instructions?	Similar requirement.
18. Are adequate identification requirements specified? 19. Are requirements for record preparation review, approval, retention, etc., adequately specified?		N45.2.11 identifies these two items regarding design reviews. These are covered in NQA-1 under Requirements 8 and 17 along with associated Supplements.
N45.2.11, § 6.3.2 Alternate Calculations	4.2.2 Alternate Calculations	
Verification of some types of calculations or analyses may be achieved by comparison with alternate methods of calculation or analyses. This shall be performed by a person or persons other than those who performed the original calculation. Where alternate calculations are performed to verify the correctness of the original calculation a review shall also be performed to address the appropriateness of assumptions, input data, and the code or other calculation method used. The alternate method used for comparison may be a more simplified approach or less rigorous, such as when a hand calculation is used to check the computer code output. Although the simplified or less rigorous method may not exactly check the original calculation or analysis, it must provide results consistent with the original calculation or analyses.	These are calculations or analyses that are made with alternate methods to verify correctness of the original calculations or analyses. The appropriateness of assumptions, input data used, and the computer program or other calculation method used shall also be reviewed.	Similar requirement.
N45.2.11, § 6.3.3 Qualification Testing	4.2.3 Qualification Tests	
N45.2.11, § 6.3.3, ¶ 1 Design verification for some designs or specific design features can be achieved by suitable qualification testing of a prototype or initial production unit.		Not a requirement.

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
<p>N45.2 In those cases where the adequacy of a design is to be verified by tests, the testing shall be identified.</p> <p>N45.2.11, § 6.3.3, ¶ 2 In those cases where the adequacy of a design is to be verified by a qualification test, the testing shall be identified and documented.</p>	<p>Where design adequacy is to be verified by qualification tests, the tests shall be identified. The test configuration shall be clearly defined and documented.</p>	<p>Similar requirement.</p>
<p>N45.2 Testing shall demonstrate adequacy of performance under the most adverse design conditions.</p> <p>N45.2.11, § 6.3.3, ¶ 2 Testing shall demonstrate adequacy of performance under the most adverse design conditions.</p>	<p>Testing shall demonstrate adequacy of performance under conditions that simulate the most adverse design conditions.</p>	<p>Similar requirement.</p>
<p>N45.2 Operating modes and environmental conditions in which the item must perform satisfactorily shall be considered in determining the most adverse conditions.</p> <p>N45.2.11, § 6.3.3, ¶ 2 All pertinent operating modes shall be considered in determining these design conditions where it is intended that the test program confirm the adequacy of the overall design.</p>	<p>Operating modes and environmental conditions in which the item must perform satisfactorily shall be considered in determining the most adverse conditions.</p>	<p>Similar requirement.</p>
<p>N45.2.11, § 6.3.3, ¶ 2 Where the test is only intended to verify a specific design feature, the other features of the design shall be verified by other means. For example, it may be most effective to verify that an instrumentation cabinet is designed to withstand the maximum earthquake-caused vibratory motions by actually subjecting the cabinet and its associated components to shaker tests which correspond to these vibratory motions. The shaker tests will not, however, verify that the circuitry is designed correctly, or that the component in the cabinet will perform its intended function. Other tests or verification means are required to confirm that remaining design functions are adequately performed by the instrumentation and that those components perform the intended functions for the varying design conditions to which they are subjected.</p>	<p>Where the test is intended to verify only specific design features, the other features of the design shall be verified by other means.</p>	<p>Similar requirement. Example from N45.2.11 is eliminated in NQA-1.</p>
<p>N45.2.1, § 6.3.3, ¶ 3 Qualification testing shall be performed in accordance with written test procedures which incorporate or reference the requirements and acceptance limits contained in applicable design documents. The test procedures shall include provisions for assuring that prerequisites for the given test have been met, that adequate instrumentation of the required range</p>	<p>Test results shall be documented and evaluated by the responsible design organization to assure that test requirements have been met.</p>	<p>Similar requirement for documenting and evaluating test results. Requirements for conduct of tests are addressed in NQA-1, Requirement 11.</p>

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
<p>and accuracy is available and used, and that necessary monitoring is performed. Prerequisites include such items as calibrated instrumentation, appropriate equipment, trained personnel, condition of test equipment and the item to be tested, suitable environmental conditions and provisions for data acquisition. Test results shall be documented and evaluated by the responsible designer to assure that test requirements have been satisfied.</p>		
<p>N45.2 If testing indicates that modifications to the item are necessary to obtain acceptable performance, the item shall be modified and retested as necessary to assure satisfactory performance. N45.2.1, § 6.3.3, ¶ 4 If testing indicates that modifications to the item are necessary to obtain acceptable performance, the modification shall be documented and the item modified and retested or otherwise verified to assure satisfactory performance.</p>	<p>If qualification testing indicates that modifications to the item are necessary to obtain acceptable performance, the modification shall be documented and the item modified and retested or otherwise verified to assure satisfactory performance.</p>	<p>Similar requirement.</p>
<p>N45.2.1, § 6.3.3, ¶ 4 When tests are being performed on models or mock-ups, scaling laws shall be established and verified. The test configuration shall be clearly defined and documented.</p>	<p>When tests are being performed on models or mockups, scaling laws shall be established and verified.</p>	<p>Similar requirement.</p>
<p>N45.2.1, § 6.3.3, ¶ 4 The results of model test work shall be subject to error analysis, where applicable, prior to use in final design work.</p>	<p>The results of model test work shall be subject to error analysis, where applicable, prior to use in final design work.</p>	<p>Similar requirement.</p>
<p>N45.2, § 4. Change Control N45.2.11, § 8. Design Change Control</p>	<p>5 CHANGE CONTROL</p>	
<p>N45.2 Design changes, including field changes, shall be governed by design control measures commensurate with those applied to the original design. N18.7, 5.2.7.2 Modifications. Design activities associated with modifications of safety-related structures, systems, and components shall be accomplished in accordance with N45.2.11-1974.[9] N45.2.11, § 8, ¶ 1 Documented procedures shall be provided for design changes to approved design documents, including field changes, which assure that the impact of the change is carefully considered, required actions documented and information concerning the</p>	<p>Changes to final designs, field changes, modifications to operating facilities, and nonconforming items dispositioned use-as-is or repair shall be justified and subject to design control measures commensurate with those applied to the original design.</p>	<p>Similar requirement.</p>

<p align="center">CRITERION 3 ANSI N45.2; N45.2.11; and N18.7</p>	<p align="center">BASIC REQUIREMENT 3 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>change is transmitted to all affected persons and organizations. These changes shall be justified and subjected to design control measures commensurate with those applied to the original design.</p>		
<p>N45.2.11, § 8.1 Reasons for Changes Design changes frequently result from such things as the following:</p> <ol style="list-style-type: none"> 1. Qualification, preoperational, or operational test results are not satisfactory. 2. Interference problems discovered during construction. 3. Failures of structures, systems, or components to meet functional requirements. 4. Disposition of nonconforming items. 5. Changes in regulatory or other requirements. 6. Operational experience. 7. Design improvement. 		<p>Examples not stated in NQA-1</p>
<p>N45.2, §4 It is the intent of this standard that design changes be reviewed and approved by the organizations that performed the original design, review, and approval. In the event that it is not practical for the original organizations to perform the required review or approval, other responsible design organizations may be designated, provided the designated organizations have access to pertinent background information, have demonstrated competence in the specific design area of interest, and have adequate understanding of the requirements and intent of the original design.</p> <p>N45.2.11, § 8.2 Review of Changes Normally, the procedures for effecting design changes shall require that the documents which reflect the design change be reviewed and approved by the same groups or organizations which reviewed and approved the original design documents. Where an organization which originally was responsible for approving a particular design document is no longer responsible, the plant owner shall designate the new responsible organization which may be the owner's own engineering organization. The designated organization shall have access to pertinent background information, have demonstrated competence in the specific</p>	<p>These measures shall include assurance that the design analyses for the structure, system. Changes shall be approved by the same affected groups or organizations which reviewed and approved the original design documents; except where an organization which originally was responsible for approving a particular design document is no longer responsible, then the Owner or his designee shall designate a new responsible organization which could be the Owner's engineering organization, or component are still valid.</p>	<p>Similar requirement.</p>

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
design area of interest and have an adequate understanding of the requirements and intent of the original design.		
	When a design change is approved other than by revision to the affected design documents, measures shall be established to incorporate the change into these documents, where such incorporation is appropriate.	Additional requirement.
N45.2.11, § 9.2 Review of Procedure Where a significant design change is necessary because of an incorrect design the design process and verification procedure shall be reviewed and modified as necessary.	Where a significant design change is necessary because of an incorrect design, the design process and verification procedure shall be reviewed and modified as necessary.	Similar requirement.
N45.2, § 4.2 Interface Control N45.2.11, § 5. Interface Control	6 INTERFACE CONTROL	
N45.2 Design control measures shall be applied as necessary to identify and control design interfaces and for coordination among participating design organizations. N45.2.11, § 5.1 External 5.1.1 Identification of Interface. The external interfaces between organizations performing work affecting quality of design shall be identified in writing and shall include those organizations providing criteria, designs, specifications and technical direction. N45.2.11, § 5.2 Internal 5.2.1 Identification of Interface. Each organization performing work affecting quality of design shall identify in writing its internal design interfaces for managing the flow of design information between organizational units.	Design interfaces shall be identified and controlled and the design efforts shall be coordinated among the participating organizations.	Similar requirement.
N45.2 These measures shall include the establishment of procedures among participating design organizations for the review, approval, release, distribution, and revision of documents involving design interfaces. N45.2.11, § 5.1 External 5.1.2 Responsibilities. Responsibilities for organizations shall be defined and documented in sufficient detail to cover the preparation, review and approval of documents involving design interfaces. Responsibilities may be set forth in tabular form or flow charts accompanied by appropriate text to clarify the intent. Appendices A and B	Interface controls shall include the assignment of responsibility and the establishment of procedures among participating design organizations for the review, approval, release, distribution, and revision of documents involving design interfaces.	Similar requirement.

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
<p>provide examples.</p> <p>N45.2.11, § 5.2 Internal 5.2.2 Responsibilities. Responsibilities for each organizational unit shall be defined and documented in sufficient detail to cover the preparation, review, approval, distribution and revision of documents involving design interfaces.</p>		
<p>N45.2.11, § 5.1 External 5.1.3 Lines of Communication. Systematic methods shall be established for communicating needed design information across external design interfaces, including changes to the design information as work progresses. Documents shall identify the positions and titles of key personnel in the communication channels and their responsibilities for decision-making, for resolution of problems, for providing and reviewing information, and for taking other action within the scope of this standard. 5.1.4 Documentation. Procedures shall be established to control the flow of design information between organizations. Design information transmitted from one organization to another shall be documented in specifications, drawings or other controlled documents which are uniquely identified and issued by authorized persons. The procedures shall provide that design interface information be transmitted to affected organizations and that any information requested in the design interface transmittal be transmitted back to the originator. Documentation requesting information or action shall be controlled by a system which assures that the response and the request can be related. Where it is necessary to initially transmit design information orally or by other informal means, the transmittal shall be confirmed promptly by a controlled document.</p> <p>N45.2.11, § 5.2 Internal 5.2.3 Lines of Communication. Systematic methods shall be established for communicating needed design information across the internal design interfaces, including changes to the design information as work progresses. 5.2.4 Documentation. Procedures shall be established to</p>	<p>Design information transmitted across interfaces shall be documented and controlled. Transmittals shall identify the status of the design information or document provided and, where necessary, identify incomplete items which require further evaluation, review, or approval. Where it is necessary to initially transmit design information orally or by other informal means, the transmittal shall be confirmed promptly by a controlled document.</p>	<p>Similar requirement. NQA-1-1994 added detail on informal communication.</p>

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
<p>control the flow of design information between organizational units. Design information transmitted from one organizational unit to another shall be documented and controlled. Transmittals shall identify, the status of the design information or document provided and, where necessary, identify incomplete items which require further evaluation, review or approval. Where it is necessary to initially transmit design information orally or by other informal means, the transmittal shall be confirmed promptly by a controlled document.</p>		
N45.2.11, § 7 Document Control	7 DOCUMENTATION AND RECORDS	
<p>N45.2 Records of implementation of these design control measures shall be available for review.</p> <p>N45.2.11, §6.1, ¶ 3 The results of design verification efforts shall be clearly documented, with the identification of the verifier clearly indicated thereon, and filed.</p> <p>N45.2.11, § 7 Document Control Documented procedures shall be used to control issuance of design documents and changes thereto. These procedures shall assure that documents, including changes, are reviewed for adequacy and approved for release by authorized personnel and are properly distributed.</p>	<p>Design documentation and records, which provide evidence that the design and design verification processes were performed in accordance with the requirements of this Part (Part 1), shall be collected, stored, and maintained in accordance with documented procedures.</p>	<p>Similar requirement.</p>
<p>N45.2.11, §6.1, ¶ 3 Documentation of results shall be auditable against the verification methods identified by the responsible design organization.</p> <p>N45.2.11, § 10, ¶ 2 The documentation shall include not only the final design documents such as drawings and specifications, and revisions thereto but also records of the important steps including sources of design inputs, which support the final design. The records shall be legible, identifiable and retrievable.</p>	<p>The documentation shall include not only final design documents, such as drawings and specifications, and revisions thereto but also documentation which identifies the important steps, including sources of design inputs that support the final design.</p>	<p>Similar requirement.</p>
<p>7.1 Document Preparation, Approval and Issue Personnel shall be made aware of and use proper and current instructions, procedures, drawings and design inputs. Participating organizations shall have documented procedures for control of design documents and changes</p>		<p>Document Control requirements for NQA-1 are addressed in Requirement 6 and Supplement 6S-1, rather than repeated under design control.</p>

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
<p>thereto to assure that current and appropriate documents are available for use. The document control procedures shall provide for:</p> <ol style="list-style-type: none"> 1. Identification of personnel positions or organizations responsible for preparing, reviewing, approving, and issuing documents and revisions thereto. This identification may take the form of Project General Instructions, design organization Policy Statements, a matrix showing document type against function, or other written forms appropriate to the organizational method of performing the design process. 2. Identification of the proper documents to be used in performing the design. The identification should include title applicable revisions, date of issue or any other relevant information that would precisely identify the document to be used. 3. Coordination and control of design (internal and external) interface documents. These interface documents should be mutually agreed to and prepared in sufficient detail to assure that the required reviews and approvals are accomplished. 4. Ascertaining that proper documents are accessible and are in fact being used. This might be accomplished by several schemes including the following examples: periodic issuance of master drawing or specification lists showing the latest applicable revision (such lists could provide a reference for auditing the accessibility and use of the latest documents); or some type of receipting system can provide assurance that the latest documents have been received and obsolete revisions recalled. An example of such a receipting system is Appendix C, Drawing Issue Check List. 5. Establishing distribution lists which are updated and maintained current to assure that the proper personnel are sent all the required documents to perform the work. ANSI N45.2.11 <p>7.2 Document Revision Significant changes to documents shall be reviewed and approved by the same organizations that performed the</p>		

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
<p>original review and approval unless other organizations are specifically designated. The reviewing organizations shall have access to pertinent background data information upon which to base their approval. However, minor changes to design documents, such as inconsequential editorial corrections or changes to commercial terms and conditions, may not require that the revised document receive the same review and approval as the original documents. To avoid a possible omission of a required review, the type of minor changes which do not require such a review and approval and the persons who can authorize such a decision shall be clearly delineated in the document control procedures.</p>		
<p>N45.2.11, § 9. Corrective Action In addition to correcting a deficiency (or error), corrective action also includes, for significant or recurring deficiencies (or errors), determining the cause and instituting appropriate changes in the design process and the quality assurance program to prevent similar types of deficiencies (or errors) from recurring. A procedure shall be employed for providing such corrective action. This procedure shall also contain provisions for reporting the deficiency and corrective action to appropriate levels of supervision and management. The procedure shall also include follow-up actions that cannot be immediately completed to assure timely resolution and/or completion of the corrective action.</p> <p>9.1 Detection of Errors Deficiencies or error in the design or the design quality assurance program may, be detected by:</p> <ol style="list-style-type: none"> 1. Design verification measures. 2. Personnel using the design documents. 3. Audits. 4. Tests conducted. 5. Actual failure during operation. 6. Other means. 		<p>NQA-1 Corrective Action requirements are identified in Basic Requirements 15 and 16 and any associated Supplements.</p>
<p>N45.2.11, § 10 Records Design documentation and records which provide evidence that the design and review process was performed in accordance with the requirements of this standard shall be</p>		<p>NQA-1 identifies most records requirements in Basic Requirement 17 and Supplement 17S-1 and doesn't repeat the information in other</p>

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
<p>collected, stored and maintained in accordance with the requirements of ANSI N45.2.9.</p> <p>...</p> <p>Documentation and records will be either of the lifetime or nonpermanent category as defined in ANSI N45.2.9.</p>		<p>sections.</p>
<p>N45.2.11, § 11. Audits</p> <p>A comprehensive system of planned and documented audits shall be carried out to verify compliance with all aspects of the Quality Assurance program for design including those procedures delineating quality assurance actions required during the design process.</p> <p>11.1 Personnel</p> <p>These audits shall be performed in accordance with written procedures or checklist by personnel not having direct responsibilities in the areas being audited. For example, the person who performs an audit on design verification should not have been responsible for performing the design verification. The personnel performing audits shall be of a level of competency and have sufficient authority and organizational freedom to make the audit process meaningful and effective.</p> <p>11.2 Internal Audits</p> <p>Design organizations performing work in accordance with the requirements of this standard shall be audited to assure that their design quality assurance programs are being implemented. Audits may be conducted internally by the design organization or by a unit independent of the design organization.</p> <p>11.3 External Audits</p> <p>Organizations shall conduct or delegate the conduct of external audits of design organizations performing work for them to assure that specified design quality assurance program requirements are being implemented and are effective.</p> <p>11.4 Audit Control</p> <p>Audits shall include an evaluation of design quality assurance policies, practices, procedures and instructions; the effectiveness of implementation; and actions taken to</p>		<p>NQA-1 Audit requirements are contained in Basic Requirements 2 and 18 and associated Supplements.</p>

<p align="center">CRITERION 3 ANSI N45.2; N45.2.11; and N18.7</p>	<p align="center">BASIC REQUIREMENT 3 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>correct deficiencies in the program. The audits should include the examination of design activities, processes and documents and records. An audit plan shall be developed and should identify the functional areas to be audited, the extent of audit within these areas to determine effectiveness, the names and assignments of those who will perform the audit, the scheduling arrangements and the methods of reporting findings and recommendations.</p> <p>11.5 Audit Schedule</p> <p>Audits should be conducted on a routine basis to establish the adequacy of and conformance to the design quality assurance requirements. Audits should also be conducted when one or more of the following conditions exists:</p> <ol style="list-style-type: none"> 1. When it is necessary to determine the capability of a subcontractor's quality assurance program prior to awarding of contract of purchase order for design services. 2. When, after award of contract, sufficient time has elapsed for the implementation of the quality assurance program for design and it is appropriate to determine that the organization is performing the functions as defined in the quality assurance program description, codes, standards and other contract documents. 3. When significant changes are made in functional areas of the quality assurance program for design including significant reorganizations and procedure revisions. 4. When it is suspected that safety related performance of the item is in jeopardy due to deficiencies and nonconformances in the quality assurance program. 5. When a systematic, independent assessment of program effectiveness or item quality or both is considered necessary. 6. When it is considered necessary to verify implementation of required corrective actions. <p>11.6 Results</p> <p>Audit results shall be documented and reviewed by management having responsibility in the areas audited. Audit reports shall be in sufficient detail to permit management evaluation of the breadth of the audit as well as the validity of the findings.</p>		

CRITERION 3 ANSI N45.2; N45.2.11; and N18.7	BASIC REQUIREMENT 3 NQA-1 1994	COMMENTS
11.7 Follow-Up Appropriate corrective action and timely follow-up action, including re-audit of deficient areas, shall be taken where indicated by the audit findings.		

<p align="center">CRITERION 4 ANSI N45.2 § 5, N45.2.13 § 3, N18.7 § 5.2.13.1</p>	<p align="center">BASIC REQUIREMENT 4 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>N45.2 Measures shall be established and documented to assure that applicable regulatory requirements, design bases, and other requirements which are necessary to assure adequate quality are included or referenced in the documents for procurement of items and services.</p> <p>N45.2.13 § 3.1 The Purchaser shall establish measures to assure that applicable regulatory requirements, design bases, and other requirements (including specific issue dates and applicable addenda) which are necessary to assure adequate quality are included or invoked by reference in the documents for procurement of items and services.</p> <p>N18.7 § 5.2.13 Procurement and Materials Control.</p> <p>¶ 1 Measures shall be provided for procurement, documentation and control of those materials and components including spare and replacement parts necessary for plant operation, refueling, maintenance and modification. These measures shall utilize American National Standard Quality Assurance Requirements for the Control of Procurement of Items and Services for Nuclear Power Plants, N45.2.13-1976. Procedures shall be established and implemented to ensure that purchased materials and components associated with safety-related structures or systems are:</p> <p>(1) Purchased to specifications and codes equivalent to those specified for the original equipment, or those specified by a properly reviewed and approved revision. (In those cases where the original item or part is found to be commercially "off the shelf," or without specifically identified quality assurance requirements, spare and replacement parts may be similarly procured but care shall be exercised to assure at least equivalent performance. In those cases where the QA requirements of the original item cannot be determined, an engineering evaluation shall be conducted by qualified individuals to establish the requirements and controls. This evaluation shall assure that interfaces, interchangeability, safety, fit and function are not adversely affected or contrary to applicable regulatory or code requirements. The results of this evaluation shall</p>	<p>Applicable design bases and other requirements necessary to assure adequate quality shall be included or referenced in documents for procurement of items and services.</p>	<p>Similar requirements.</p> <p>ANSI N18.7 contains more detail on the applicability of the measures and the need for procedures to control the procurement process. These are covered in a more general sense in the Introduction section of NQA-1, Part I. ANSI N18.7 invokes the use of ANSI N45.2.13 requirements related to Procurement Document Control (Section 3 of that standard). The applicable requirements have been included in NQA-1, Supplement 4S-1. This has been acknowledged by the NRC through the withdrawal of the Regulatory Guide (1.123) that endorsed ANSI N45.2.13 where licensees are committing to NQA-1.</p>

CRITERION 4 ANSI N45.2 § 5, N45.2.13 § 3, N18.7 § 5.2.13.1	BASIC REQUIREMENT 4 NQA-1 1994	COMMENTS
be documented) N18.7 § 5.2.13.1 Procurement Document Control. Measures shall be provided to assure that applicable regulatory requirements, design bases and other requirements which are necessary to assure adequate quality are included or referenced in the procedures for procurement of items and services.		
N45.2 To the extent necessary, procurement documents shall require contractors to provide a Quality Assurance Program consistent with the pertinent requirements of this standard. N18.7 5.2.13.1 To the extent necessary, procurement documents shall require suppliers to provide a quality assurance program consistent with the pertinent requirements of American National Standard Quality Assurance Program Requirements for Nuclear Power Plants, N45.2-1971. [2]	To the extent necessary, procurement documents shall require Suppliers to have a quality assurance program consistent with the applicable requirements of this Part (Part1).	Similar requirement.
	SUPPLEMENT 4S-1 SUPPLEMENTARY REQUIREMENTS FOR PROCUREMENT DOCUMENT CONTROL	
	1 GENERAL	
	This Supplement provides amplified requirements for procurement document control.	
	It supplements the requirements of Basic Requirement 4 of this Part (Part1) and shall be used in conjunction with that Basic Requirement when and to the extent specified by the organization invoking this Part (Part1).	
	2 CONTENT OF THE PROCUREMENT DOCUMENTS	
N45.2 Procurement documents shall include provisions for the following, as applicable: N45.2.13 § 3.2 Content of the Procurement Documents - Procurement documents issued at all tiers of procurement shall include provisions for the following, as deemed necessary by the Purchaser:	Procurement documents issued at all tiers of procurement shall include provisions for the following, as deemed necessary by the Purchaser.	Similar requirement.
N45.2.13 § 3.2.1 Scope of Work.	2.1 Scope of Work	
N45.2.13 § 3.2.1 A statement of the scope of the work to be performed by the Supplier shall be in the procurement	A statement of the scope of the work to be performed by the Supplier shall be in the procurement documents.	Similar requirement.

<p align="center">CRITERION 4 ANSI N45.2 § 5, N45.2.13 § 3, N18.7 § 5.2.13.1</p>	<p align="center">BASIC REQUIREMENT 4 NQA-1 1994</p>	<p align="center">COMMENTS</p>
documents.		
<p>ANSI N45.2, (2) Basic Technical Requirements</p>	<p>2.2 Technical Requirements</p>	
<p>ANSI N45.2 Drawings, specifications, codes and industrial standards with applicable revision data, test and inspection requirements, and special instructions and requirements, such as for designing, fabricating, cleaning, erecting, packaging, handling, shipping, and, if applicable, extended storage in the field; and for test equipment.</p> <p>N45.2.13 § 3.2.2 Technical Requirements. Technical requirements shall be specified in the procurement documents by reference to the specific drawings, specifications, codes, regulations, procedures or instructions including revisions thereto that describe the items or services to be furnished. The procurement documents shall identify or provide for later identification of test, inspection and acceptance requirements, and any special instructions and requirements for such activities as designing, identification, fabrication, cleaning, erecting, packaging, handling, shipping and extended storage. All such technical requirement documents shall be prepared, reviewed and released under the requirements established by ANSI N45.2.11.</p> <p>N18.7 § 5.2.13.1, ¶ 2 Procurement documents shall include provisions for the following, as applicable: (2) Basic Technical Requirements. Where specific technical requirements apply, such as drawings, specifications, and industrial codes and standards, they shall be identified by titles and dates of issue in such a way as to clearly set forth the applicable documents. Where procedural requirements apply, in such areas as test and inspection needs, fabrication, cleaning, erecting, packaging, handling, shipping and storage, they too, shall be identified clearly and in such a way as to avoid uncertainty as to source and need.</p>	<p>Technical requirements shall be specified in the procurement documents. Where necessary, these requirements shall be specified by reference to specific drawings, specifications, codes, standards, regulations, procedures, or instructions, including revisions thereto that describe the items or services to be furnished. The procurement documents shall provide for identification of test, inspection, and acceptance requirements of the Purchaser for monitoring and evaluating the Supplier's performance.</p>	<p>Similar requirement.</p>
<p>N45.2 (1) Supplier Quality Assurance Program</p>	<p>2.3 Quality Assurance Program Requirements</p>	
<p>N45.2 (1) Identification of quality assurance requirements and the elements of the program applicable to the items or services procured. This may be accomplished in various ways, such as the following: (a) invoking this standard by</p>	<p>Procurement documents shall require that the Supplier have a documented quality assurance program that implements portions or all of the requirements of this Part (Part1).</p>	<p>Similar requirement. The appendix referred to in N45.2.13 was not considered a part of the standard. The guidance in the</p>

CRITERION 4 ANSI N45.2 § 5, N45.2.13 § 3, N18.7 § 5.2.13.1	BASIC REQUIREMENT 4 NQA-1 1994	COMMENTS
<p>reference, or (b) invoking applicable sections or elements of this standard, or (c) invoking other specific requirements which meet the intent of this standard.</p> <p>N45.2.13 § 3.2.3 Quality Assurance Program Requirements. Procurement documents shall require that the Supplier have a documented quality assurance program that implements portions or all of ANSI N45.2 as well as applicable quality assurance program requirements of other nationally recognized codes and standards. (The Appendix provides an explanation and examples of logic and considerations which may be used to decide how and to what extent quality assurance program requirements shall be specified in procurement documents. The Appendix is not a part of this standard.)</p> <p>N18.7 § 5.2.13.1, ¶ 1, Sentence 2 - To the extent necessary, procurement documents shall require suppliers to provide a quality assurance program consistent with the pertinent requirements of American National Standard Quality Assurance Program Requirements for Nuclear Power Plants, N45.2-1971.</p>		<p>appendix has been incorporated into the NQA-1 nonmandatory guidance of Appendices 4A-1 and 7A-1.</p>
<p>N18.7 § 5.2.13, ¶ 1 The Appendix to N45.2.13 is particularly useful in determining the quality assurance requirements depending on the complexity or safety of the item.</p> <p>N18.7 § 5.2.13.1, ¶ 2 Procurement documents shall include provisions for the following, as applicable: (1) Supplier Quality Assurance Program. Identification of quality assurance requirements applicable to the items or services procured.</p>	<p>The extent of the program required shall depend upon the type and use of the item or service being procured.</p>	<p>Similar requirement. The appendix referred to in N45.2.13 was not considered a part of the standard. The guidance in the appendix has been incorporated into the NQA-1 nonmandatory guidance of Appendices 4A-1 and 7A-1.</p>
<p>N45.2 (5) Lower Tier Procurements. Provisions for extending applicable requirements of procurement documents to lower tier subcontractors and suppliers, including purchaser's access to facilities and records.</p> <p>N45.2.13 § 3.2.3 The procurement documents shall require the Supplier to incorporate appropriate quality assurance program requirements in subtier procurement documents.</p> <p>N18.7 § 5.2.13.1, ¶ 2 Procurement documents shall include provisions for the following, as applicable: (5) Lower Tier Procurement. Provisions for extending applicable</p>	<p>The procurement documents shall require the Supplier to incorporate appropriate quality assurance program requirements in subtier procurement documents.</p>	<p>Similar requirement. The appendix referred to in N45.2.13 was not considered a part of the standard. The guidance in the appendix has been incorporated into the NQA-1 nonmandatory guidance of Appendices 4A-1 and 7A-1.</p>

CRITERION 4 ANSI N45.2 § 5, N45.2.13 § 3, N18.7 § 5.2.13.1	BASIC REQUIREMENT 4 NQA-1 1994	COMMENTS
requirements to lower tier subcontractors and suppliers, including purchaser's access to facilities and records.		
N45.2(3) Source Inspection and Audit	2.4 Right of Access	
<p>N45.2 Provisions for access to the plant facilities and records for source inspection and audit when the need for such inspection or audit has been determined.</p> <p>N45.2.13 § 3.2.4 Right of Access. At each tier of a procurement, the procurement document shall provide, as deemed necessary by the Purchaser, for access to the Supplier's plant facilities and records for inspection or audit by the Purchaser, his designated representative, and/or other parties authorized by the Purchaser. The provisions should include a statement of the minimum time of advance notice and the method of communication of such notice. They should include or provide for the later identification (see Section 6.2) of the events such as witness and hold points established or considered appropriate for the Purchaser's presence at the Supplier's facility.</p> <p>N18.7 § 5.2.13.1, ¶ 2 Procurement documents shall include provisions for the following, as applicable: (3) Source Inspection and Audit. Provisions for access to the supplier's facilities and records for source inspection and audit when the need for such inspection or audit has been determined.</p>	<p>At each tier of a procurement, the procurement documents shall provide for access to the Supplier's plant facilities and records for inspection or audit by the Purchaser, his designated representative, and/or other parties authorized by the Purchaser.</p>	<p>Similar requirements. N45.2.13 contains guidance on sufficient notice for access to a supplier's facility that are more good business sense than quality assurance requirements.</p>
(4) Documentation Requirements.	2.5 Documentation Requirements	
<p>N45.2 Records to be prepared, maintained, submitted. Or made available for review, such as drawings, specifications, procedures, procurement documents, inspection and test records, personnel and procedure qualifications, and material, chemical, and physical test results.</p> <p>N45.2.13 § 3.2.5 Documentation Requirements. The procurement documents at all tiers shall identify the documentation required to be submitted, including quality assurance records for information, review, or approval of the Purchaser. The time of submittal shall also be established.</p> <p>N18.7 § 5.2.13.1, ¶ 2 Procurement documents shall include</p>	<p>The procurement documents at all tiers shall identify the documentation required to be submitted for information, review, or approval by the Purchaser. The time of submittal shall also be established.</p>	<p>Similar requirement.</p>

CRITERION 4 ANSI N45.2 § 5, N45.2.13 § 3, N18.7 § 5.2.13.1	BASIC REQUIREMENT 4 NQA-1 1994	COMMENTS
provisions for the following, as applicable: (4) Documentation Requirements. Records to be prepared, maintained, submitted or made available for review, such as drawings, specifications, procedures, procurement documents, inspection and test records, personnel and procedure qualifications, and material, chemical, and physical test results. ...		
N45.2 Instruction on record retention and disposition shall be provided. N45.2.13 § 3.2.5 - The Purchaser shall prescribe to the Supplier those quality assurance records of compliance for which retention responsibility remains with the Supplier. ANSI N45.2.9 provides guidance for retention and disposition of quality assurance records. N18.7 § 5.2.13.1, ¶ 2 Procurement documents shall include provisions for the following, as applicable: (4) ... Instruction on record retention and disposition shall be provided.	When the Purchaser requires the Supplier to maintain specific quality assurance records, the retention times and disposition requirements shall be prescribed.	Similar requirement.
	2.6 Nonconformances	
N45.2.13 § 3.2.6 Nonconformances. The procurement documents shall include Purchaser's requirements for reporting and approving disposition of nonconformances. Section 8 of this standard provides further guidelines on handling nonconformances.	The procurement documents shall include Purchaser's requirements for reporting and approving disposition of nonconformances.	Similar requirement.
	2.7 Spare and Replacement Parts	
N18.7 § 5.2.13 Procurement and Materials Control. ¶ 1 Measures shall be provided for procurement, documentation and control of those materials and components including spare and replacement parts necessary for plant operation, refueling, maintenance and modification.	The procurement documents shall require the identification of appropriate spare and replacement parts or assemblies and the appropriate delineation of the technical and quality assurance related data required for ordering these parts or assemblies.	Similar requirement.
N45.2.13 § 3.3 Procurement Document Review	3 PROCUREMENT DOCUMENT REVIEW	
N45.2.13 § 3.3 A review of the procurement documents shall be made to assure that documents transmitted to the prospective Suppliers for bid or contract purposes include appropriate provisions to assure items or services meet the specified requirements.	A review of the procurement documents and changes thereto shall be made to assure that documents transmitted to the prospective Supplier(s) include appropriate provisions to assure that items or services will meet the specified requirements.	Similar requirement.
N45.2.13 § 3.3 - a. Such reviews shall be performed prior	Reviews shall be performed and documented to provide	Similar requirement.

<p align="center">CRITERION 4 ANSI N45.2 § 5, N45.2.13 § 3, N18.7 § 5.2.13.1</p>	<p align="center">BASIC REQUIREMENT 4 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>to release for bid and contract award and shall assure that the documents are complete and contain the applicable requirements specified in Section 3.2 of this standard. d. Performance of reviews shall be documented to provide objective evidence of accomplishment.</p>	<p>objective evidence of satisfactory accomplishment of such review prior to contract award.</p>	
<p>N45.2.13 § 3.3 - b. Changes made in the procurement documents as a result of the bid evaluations or precontract negotiations shall be incorporated into the procurement documents. The review of such changes and their effects shall be completed prior to contract award.</p>	<p>Changes made as a result of the bid evaluations or precontract negotiations shall be incorporated into the procurement documents. The review of such changes and their effects shall be completed prior to contract award.</p>	<p>Similar requirement.</p>
<p>N45.2.13 § 3.3 - b - This review shall include the following considerations. 1) Appropriate requirements specified in Section 3.2. 2) Determination of any additional or modified design criteria imposed after preparation of the procurement documents. 3) Analysis of exceptions or changes requested or specified by the Supplier and determination of the effects such changes may have on the intent of the procurement documents or quality of the item or service to be furnished.</p>	<p>This review shall include the following considerations: (a) appropriate requirements specified in Section 2 of this Supplement; (b) determination of any additional or modified design criteria, (c) analysis of exceptions or changes requested or specified by the Supplier and determination of the effects such changes may have on the intent of the procurement documents or quality of the item or service to be furnished.</p>	<p>Similar requirement.</p>
<p>N45.2.13 § 3.3 - c. Reviews required by this section shall be performed by personnel who have access to pertinent information and who have an adequate understanding of the requirements and intent of the procurement documents.</p>	<p>Reviews required by this Section shall be performed by personnel who have access to pertinent information and who have an adequate understanding of the requirements and intent of the procurement documents.</p>	<p>Similar requirement.</p>
	<p align="center">4 PROCUREMENT DOCUMENT CHANGES</p>	
<p>N45.2 Changes in procurement documents shall be subject to the same degree of control as was utilized in the preparation of the original document. N45.2.13 § 3.4 Procurement Document Control Procurement documents shall be controlled in accordance with ANSI N45.2 Section 7. N18.7 § 5.2.13.1 ¶1, sentence 3 - Where changes are made to procurement documents, they shall be subject to the same degree of control as was used in the preparation of the original documents. Alternative from current VA QA Topical Report With regard to Section 5.2.13.1 of ANSI N18.7-1976, titled Procurement Document Control: The words “the same degree of control” in the last sentence are replaced</p>	<p>Procurement document changes shall be subject to the same degree of control as utilized in the preparation of the original documents.</p>	<p>Similar requirements. The controls of ANSI N45.2 Section 7 are those related to Criterion 6, Document Control. The VA alternatives are inconsistent between N18.7 and N45.2.13. The clarifying statement for N45.2.13 is bounded by the context of the related statements (e.g., Section 3) within NQA-1 and the clarifications are no longer considered necessary.</p>

<p align="center">CRITERION 4 ANSI N45.2 § 5, N45.2.13 § 3, N18.7 § 5.2.13.1</p>	<p align="center">BASIC REQUIREMENT 4 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>with “Engineering review.” N45.2.13 § 3.1, sentence 2 - Procurement document changes shall be subject to the same degree of control as utilized in the preparation of the original documents. Alternative from current VA QA Topical Report: (3) With regard to Section 3.1 of ANSI N45.2.13-1976, titled Procurement Document Preparation, Review and Change Control: The phrase “the same degree of control” is stipulated to mean “equivalent level of review and approval.” The changed document may not always be rereviewed by the originator; however, at least an equivalent level supervisor shall review and approve any changes.</p>		

<p align="center">CRITERION 5 ANSI N45.2 § 6 - ANSI N18.7</p>	<p align="center">BASIC REQUIREMENT 5 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>Related Definitions: ANSI N45.2.10 Procedure – a document that specifies or describes how an activity is to be performed. It may include methods to be employed, equipment or materials to be used and sequence of operations.</p>	<p>Procedure – a document that specifies or describes how an activity is to be performed</p>	<p>Similar definition.</p>
<p>Related Definitions: ANSI N45.2.10 Qualified Procedure- A procedure which incorporates all applicable codes and standards, manufacturer’s parameters, and engineering specifications and has been proven adequate for its intended purpose.</p>	<p>Qualified Procedure – an approved procedure that has been demonstrated to meet the specified requirements for its intended purpose.</p>	<p>Similar definition.</p>
<p>Related Definitions: ANSI N18.7 emergency procedures. Written procedures which specify actions, including manipulation of plant controls, to reduce the consequence of an accident or potentially hazardous condition which has already occurred, to implement the emergency plan, or to prepare for possible hazardous natural occurrences. maintenance and modification procedures. Written procedures defining the policies and practices by which structures; mechanical, electrical and instrumentation and control systems; and components thereof of a nuclear power plant are kept in a condition of good repair or efficiency so that they are capable of performing their intended functions. As used in this Standard, these procedures apply to those activities performed by maintenance or contractor personnel to maintain, repair or modify safety-related equipment. Related activities are those actions taken by operating personnel to determine that a planned maintenance activity can be safely performed under the existing plant operating conditions, to authorize the release of equipment to be maintained in accordance with equipment control procedures, and to assure that the equipment has been returned to normal operating status at the completion of the maintenance work including verification of functional acceptability. Procedures for these related activities by operating personnel are considered to be operating procedures, but may be included in maintenance procedures.</p>		<p>No related definitions in NQA-1 Procedure types are discussed in the QAPD.</p>

CRITERION 5 ANSI N45.2 § 6 - ANSI N18.7	BASIC REQUIREMENT 5 NQA-1 1994	COMMENTS
<p>off-normal condition procedures. Written procedures which specify operator actions for restoring an operating variable to its normal controlled value when it departs from its range or to restore normal operating conditions following a perturbation. Such actions are invoked following an operator observation or an annunciator alarm indicating a condition which, if not corrected, could degenerate into a condition requiring action under an emergency procedure</p> <p>operating procedures. Written procedures defining the normal method, means and limits of operation of a nuclear power plant, a plant system or systems, or processes, including actions to be taken by operating personnel for removal from and return to service equipment on which maintenance is to be or has been performed (see also maintenance and modification procedures).</p>		
<p>Related Definitions: ANSI N45.2.10</p> <p>Documentation - any written or pictorial information describing, defining, specifying, reporting or certifying activities, requirements, procedures, or results.</p>	<p>Document – any written or pictorial information describing, defining, specifying, reporting or certifying activities, requirements, procedures, or results. A document is not considered to be a Quality Assurance Record until it satisfies the definition of a Quality Assurance Record as defined in this Supplement.</p>	<p>Similar definition.</p>
<p>ANSI N45.2 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.</p> <p>N18.7 - 5.3 The administrative controls and quality assurance program shall be carried out through plant life in accordance with written procedures. Activities affecting safety at nuclear power plants shall be described by written procedure of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions and procedures.</p> <p>5.2.7 Maintenance or modifications of equipment shall be preplanned and performed in accordance with written procedures, documented instructions or</p>	<p>Activities affecting quality shall be prescribed by and performed in accordance with documented instructions, procedures, or drawings of a type appropriate to the circumstances.</p>	<p>Similar requirement.</p> <p>ANSI N18.7 contains a lot of specific detail on the type and content of procedures. Will incorporate the appropriate information into the QAPD using current alternatives to N18.7 without a specific commitment to N18.7 to avoid confusion by use of redundant standards.</p> <p>Reference: ANSI N45.2.4, 5, 6, 8, and 11 contain additional procedure requirements. These have been incorporated into NQA-1, Subparts 2.4, 2.5, 2.6, and 2.8. N45.2.11 requirements are incorporated into Supplement 3S-1 of NQA-1.</p>

<p align="center">CRITERION 5 ANSI N45.2 § 6 - ANSI N18.7</p>	<p align="center">BASIC REQUIREMENT 5 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>drawings appropriate to the circumstances which conform to applicable codes, standards, specifications, and criteria. Skills normally possessed by qualified maintenance personnel may not require detailed step-by-step delineations in a written procedure.</p>		<p>Reg. Guide 1.33 lists the activities that require procedures. Will continue to have procedures of the types addressed by Reg. Guide 1.33</p>
<p>N45.2 - Instructions, procedures, or drawings shall include appropriate quantitative or qualitative criteria for determining that important activities have been satisfactorily accomplished. The activity may be prescribed in job specifications, work instructions, shop construction drawings, job tickets, planning sheets, operating or procedure manuals, test procedures, or any other type of written form, provided that the activity is adequately described. Quantitative criteria, such as dimensions, tolerances, and operating limits, and qualitative criteria, such as comparative workmanship samples, shall be specified, as appropriate, for determining satisfactory work performance and quality compliance.</p> <p>ANSI N18.7 – 5.3 These procedures shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished. These procedures shall provide an approved preplanned method of conducting operations. Procedures shall be prepared and approved prior to implementation as required by 4.3 and 5.2.15.</p>	<p>These documents shall include or reference appropriate quantitative or qualitative acceptance criteria for determining that prescribed activities have been satisfactorily accomplished.</p>	<p>Similar requirement. NQA-1 is not as detailed in describing examples of quantitative criteria. The requirement regarding approved preplanned methods is addressed in the Introduction to Part II of NQA-1 and in the appropriate Subparts.</p>
<p>ANSI N18.7 – 5.2.2 Procedure Adherence. Procedures shall be followed, and the requirements for use of procedures shall be prescribed in writing. Rules shall be established which provide methods by which temporary changes to approved procedures can be made, including the designation of a person or persons authorized to approve such changes. Temporary changes which clearly do not change the intent of the approved procedure, shall as a minimum be approved by two members of the plant staff knowledgeable in the areas affected by the procedures. At least one of these</p>		<p>The requirement to have and work in accordance with procedures is addressed in the Basic Requirement of NQA-1. The level of detail of N18.7 is not contained in the Basic or Supplemental requirements of NQA-1. This is addressed in the QAPD.</p>

<p align="center">CRITERION 5 ANSI N45.2 § 6 - ANSI N18.7</p>	<p align="center">BASIC REQUIREMENT 5 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>individuals shall be the supervisor in charge of the shift and hold a senior operators license on the unit affected. Such changes shall be documented and, if appropriate, incorporated in the next revision of the affected procedure. In the event of an emergency not covered by an approved procedure, operations personnel shall be instructed to take action so as to minimize personnel injury and damage to the facility and to protect health and safety.</p> <p>Guidance should be provided to identify the manner in which procedures are to be implemented. Examples of such guidance include identification of those tasks that require:</p> <ul style="list-style-type: none"> (1) The written procedure to be present and followed step by step while the task is being performed (2) The operator to have committed the procedural steps to memory (3) Verification of completion of significant steps, by initials or signatures, of checkoff lists. <p>The types of procedures that shall be present and referred to directly are those developed for extensive or complex jobs where reliance on memory cannot be trusted, e.g., reactor start-up, tasks which are infrequently performed, and tasks in which operations must be performed in a specified sequence. Procedural steps for which actions should be committed to memory include, for example, immediate actions in emergency procedures. Routine procedural actions that are frequently repeated may not require the procedure to be present. Copies of all procedures shall be available to appropriate members of the plant staff. If documentation of an action is required, the necessary data shall be recorded as the task is performed. Examples of procedures requiring verification are furnished in 5.3.4.1 and 5.3.4.2.</p> <p>The Current VA program has the following alternative to this section: With regard to Section 5.2.2 of ANSI 18.7-1976, titled Procedure Adherence: The third and fourth sentences of the first paragraph of the Section address approval</p>		

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<p>requirements for temporary changes to procedures which do not change the intent of the approved procedure. Adequate reviews will be provided by two members of the plant supervisory staff knowledgeable in the areas affected, one of which will hold a senior reactor operator license on the unit affected. Adequate reviews will be performed in accordance with Section 17.2.5 above, the Technical Specifications for Surry Power Station and Appendix C of this topical report for North Anna Power Station.</p>		
<p>ANSI N18.7 5.2.3 Operating Orders. A mechanism shall be provided for dissemination to the plant staff of instructions of general and continuing applicability to the conduct of business. Such instructions, sometimes also referred to as standing orders or standard operating procedures, should deal with job turnover and relief, designation of confines of control room, definition of duties of operators and others, transmittal of operating data to management filing of charts, limitations on access to certain areas and equipment, shipping and receiving instructions, or other such matters. Provisions should be made for periodic review and updating of standing orders.</p>		<p>No similar specifics in NQA-1. Addressed in the QAPD.</p>
<p>ANSI N18.7 5.2.4 Special Orders. A mechanism shall be provided for issuing management instructions which have short-term applicability and which require dissemination. Such instructions, sometimes referred to as a special orders, should encompass special operations, housekeeping, data taking, publications and their distribution, plotting process parameters, personnel actions, or other similar matters. Provisions should be made for periodic review, updating and cancellation of special orders.</p>		<p>No similar specifics in NQA-1. Addressed in the QAPD.</p>
<p>ANSI N18.7 5.2.5 Temporary Procedures. Temporary procedures may be issued during the operational phase: to direct operations during testing, refueling, maintenance and modifications; to provide guidance in unusual situations not within the scope of the normal procedures; and to insure orderly and uniform operations for short periods when the plant, a system, or</p>		<p>No similar specifics in NQA-1. Addressed in the QAPD.</p>

<p align="center">CRITERION 5 ANSI N45.2 § 6 - ANSI N18.7</p>	<p align="center">BASIC REQUIREMENT 5 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>a component of a system is performing in a manner not covered by existing detailed procedures or has been modified or extended in such a manner that portions of existing procedures do not apply. Temporary procedures shall include designation of the period of time during which they may be used and shall be subject to the review process prescribed in 4.3 and 5.2.15 as applicable.</p> <p>Temporary procedures shall be approved by the management representative assigned approval authority.</p>		
<p>ANSI N18.7 5.3 Preparation of Instructions and Procedures. The administrative controls and quality assurance program shall be carried out throughout plant life in accordance with written procedures. Activities affecting safety at nuclear power plants shall be described by written procedures of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions and procedures. These procedures shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished. These procedures shall provide an approved preplanned method of conducting operations. Procedures shall be prepared and approved prior to implementation as required by 4.3 and 5.2.15.</p>		<p>No similar specifics in NQA-1. Addressed in the QAPD.</p>
<p>ANSI N18.7 5.3.1 Procedure Scope. Each procedure shall be sufficiently detailed for a qualified individual to perform the required function without direct supervision, but need not provide a complete description of the system or plant process</p>		<p>No similar specifics in NQA-1. Addressed in the QAPD.</p>
<p>ANSI N18.7 5.3.2 Procedure Content. The format of procedures may vary from plant to plant, depending on the policies of the owner organization. However, procedures shall include, as appropriate, the following elements:</p> <p>(1) Title. Each procedure should contain a title descriptive of the work or system or unit to which it applies, a revision number or date, and an approval</p>		<p>NQA-1 addresses the main requirements of this in Part II, the remainder is addressed in the QAPD.</p>

CRITERION 5 ANSI N45.2 § 6 - ANSI N18.7	BASIC REQUIREMENT 5 NQA-1 1994	COMMENTS
<p>status.</p> <p>(2) Statement of Applicability. The purpose for which the procedure is intended should be clearly stated; for example, for use during reactor or plant start-up. If the purpose is not clear from the title, a separate statement of applicability should be provided, which may identify the reasons for particular operations.</p> <p>(3) References. References, including reference to technical specifications, should be included in procedures as applicable. References should be identified within the body of procedures when the sequence of steps requires other tasks to be performed prior to or concurrent with a particular step within that task.</p> <p>(4) Prerequisites. Each procedure should identify those independent actions or procedures which shall be completed and plant conditions which shall exist prior to its use. Prerequisites applicable only to certain sections of a procedure should be so identified.</p> <p>(5) Precautions. Precautions should be established to alert the individual performing the task to those important measures which should be used to protect equipment and personnel, including the public, or to avoid an abnormal or emergency situation. It may be convenient to specify precautions separately. Cautionary notes applicable to specific steps in the procedure should be included in the main body of the procedure and should be identified as such.</p> <p>(6) Limitations and Actions. Limitations on the parameters being controlled and appropriate corrective measures to return the parameter to the normal control band should be specified. It may be convenient to specify limitations and setpoints in a separate section. Where appropriate, quantitative control guides should be provided; for example, an appropriate step of a procedure should say "Manually adjust the feedwater flow controller to maintain the reactor water level at x feet," rather than "Manually adjust the feedwater flow to maintain water level."</p>		

CRITERION 5 ANSI N45.2 § 6 - ANSI N18.7	BASIC REQUIREMENT 5 NQA-1 1994	COMMENTS
<p>(7) Main Body. The main body of a procedure should contain step-by-step instructions in the degree of detail necessary for performing a required function or task.</p> <p>(8) Acceptance Criteria. Procedures should contain, where applicable, acceptance criteria against which the success or failure of test-type activity would be judged. In some cases there would be qualitative criteria, i.e., a given event does or does not occur. In other cases quantitative values would be designated.</p> <p>(9) Checkoff Lists. Complex procedures should have checkoff lists. These lists may be included as part of the procedure or may be appended to the procedure.</p>		
<p>ANSI N18.7 5.3.3 System Procedures. Instructions for energizing, filling, venting, draining, starting up, shutting down, changing modes of operation and other instructions appropriate for operations of systems related to the safety of the plant shall be delineated in system procedures. Procedures for correcting off-normal conditions shall be developed for those events where system complexity may lead to operator uncertainty. System procedures shall contain checkoff lists where appropriate.</p>		<p>No similar specifics in NQA-1. Addressed in the QAPD.</p>
<p>ANSI N18.7 5.3.4 General Plant Procedures. General plant procedures provide instructions for the integrated operations of the plant. In addition to the characteristics of procedures presented in 5.3.1 and 5.3.2, details concerning specific general plant procedures are emphasized in the following sections.</p>		<p>No similar specifics in NQA-1. Addressed in the QAPD.</p>
<p>ANSI N18.7 5.3.4.1 Start-up Procedures. Start-up procedures shall be provided that include starting the reactor from cold or hot conditions and establishing power operation, with the generator synchronized to the line. Recovery from reactor trips shall be in accordance with the start-up procedure and shall be subject to the determinations set forth in 5.2.1.</p> <p>(1) Prerequisites. Start-up procedures shall include provisions for documented determination that prerequisites have been met, including confirmation that</p>		<p>No similar specifics in NQA-1. Addressed in the QAPD.</p>

<p align="center">CRITERION 5 ANSI N45.2 § 6 - ANSI N18.7</p>	<p align="center">BASIC REQUIREMENT 5 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>necessary instruments are operable and properly set; valves are properly aligned; necessary systems procedures, tests and calibrations have been completed; and required approvals have been obtained. Checkoff lists are normally used for this purpose.</p> <p>(2) Main Body. The main body of the start-up procedures shall include the major steps of the start-up sequence, including reference to appropriate system procedures. Such major steps shall include or reference detailed instructions for their performance, for example, minimum instrumentation requirements, coverage of control rod withdrawal sequence or soluble poison dilution, manipulation of controls, establishment of feed and steam flow and turbine start-up and synchronization. Checkoff lists should be used for the purpose of confirming completion of major steps in proper sequence.</p>		
<p>ANSI N18.7 5.3.4.2 Shutdown Procedures. Shutdown procedures shall be provided to guide operations during and following controlled shutdown or reactor trips and shall include instructions for establishing or maintaining hot standby or cold shutdown conditions, as applicable. The major steps involved in shutting down the plant shall be specified, including detailed instructions for the performance of such actions as monitoring and controlling reactivity, load reduction and cooldown rates, sequence of activating or deactivating equipment, requirements for prompt analyses of causes of reactor trips or abnormal conditions requiring unplanned controlled shutdowns, and provisions for decay heat removal. Checkoff lists should be used for the purpose of confirming completion of major steps in proper sequence.</p>		<p>No similar specifics in NQA-1. Addressed in the QAPD.</p>

<p align="center">CRITERION 5 ANSI N45.2 § 6 - ANSI N18.7</p>	<p align="center">BASIC REQUIREMENT 5 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>ANSI N18.7 5.3.4.3 Power Operation and Load Changing Procedures. Procedures for steady-state power operation and load changing shall be provided that include, for example, provisions for use of control rods, chemical shim, coolant flow control or any other system available for long- or short-term control of reactivity, making deliberate load changes, responding to unanticipated load changes and adjusting operating parameters.</p>		<p>No similar specifics in NQA-1. Addressed in the QAPD.</p>
<p>ANSI N18.7 5.3.4.4 Process Monitoring Procedures. Procedures for monitoring performance of plant systems shall be required to assure that core thermal margins and coolant quality are maintained at all times, that integrity of fission product barriers is maintained at all times and that engineered safety features and emergency equipment are in a state of readiness to maintain the plant in a safe condition if needed. The limits (maximum and minimum) for significant process parameters shall be identified. The nature and frequency of this monitoring shall be covered by operating procedures, as appropriate.</p>		<p>No similar specifics in NQA-1. Addressed in the QAPD.</p>
<p>ANSI N18.7 5.3.4.5 Fuel-Handling Procedures. Fuel-handling operations shall be performed in accordance with written procedures. These procedures shall specify actions for core alterations, accountability of fuel and partial or complete refueling operations that include, for example, continuous monitoring of the neutron flux throughout core loading, periodic recording of date, audible annunciation of abnormal flux increases and evaluation of core neutron multiplication to verify the safety of loading increments.</p> <p>Provisions shall be made for preparing specific procedures for each refueling outage and for receipt and shipment of fuel. Plant procedures should, nonetheless, prescribe the general preplanning for the fuel-handling program and its associated safety measures and should identify those aspects of the program for which procedures are to be prepared for each refueling outage.</p> <p>(1) Prerequisites. Prerequisites shall be</p>		<p>No similar specifics in NQA-1. Addressed in the QAPD.</p>

<p align="center">CRITERION 5 ANSI N45.2 § 6 - ANSI N18.7</p>	<p align="center">BASIC REQUIREMENT 5 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>provided in the fuel-handling procedures that include, for example, the status of plant systems required for refueling; inspection of replacement fuel, control rods, poison curtains and internals; designation of proper tools; proper conditions for spent fuel movement; proper conditions for fuel cask loading and movement; and status of interlocks, reactor trip circuits and mode switches.</p> <p>(2) Main Body. The main body of fuel-handling procedures shall include requirements for refueling; for example, the status of the core, instructions for proper sequence, orientation, and seating of fuel and components, rules for minimum operable instrumentation, actions to be followed in the event of fuel damage, rules for periods when refueling is interrupted, verification of the shutdown margin and the frequency of determination, communications between control room and the fuel loading station, independent verification of fuel and component location, criteria for stopping refueling and for reducing the size of the fuel loading increment, and a containment evacuation plan and its associated safety measures. Documentation of final fuel and component serial numbers and locations shall be maintained.</p>		
<p>ANSI N18.7 5.3.6 Radiation Control Procedures. Procedures shall be provided for implementation of a radiation control program to meet applicable program requirements. The radiation control program involves the acquisition of data and provision of equipment to perform necessary radiation surveys, measurements and evaluations for the assessment and control of radiation hazards associated with a nuclear power plant. Procedures shall be developed and implemented for: monitoring both external and internal exposures of employees, utilizing accepted techniques; routine radiation surveys of work areas; environmental monitoring in the vicinity of the plant; radiation monitoring of maintenance and special work activities; and for maintaining records demonstrating the adequacy</p>		<p>No similar specifics in NQA-1. Addressed in the QAPD.</p>

<p align="center">CRITERION 5 ANSI N45.2 § 6 - ANSI N18.7</p>	<p align="center">BASIC REQUIREMENT 5 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>of measures taken to control radiation exposures of employees and others.</p>		
<p>ANSI N18.7 5.3.7 Calibration and Test Procedures. Procedures shall be provided for periodic calibration and testing of safety-related instrumentation and control systems. Procedures shall also be provided for periodic calibration of measuring and test equipment used in activities affecting the quality of these systems. The procedures shall provide for meeting surveillance schedules and for assuring measurement accuracy adequate to keep safety-related parameters within operational and safety limits.</p>		<p>No similar specifics in NQA-1. Addressed in the QAPD.</p>
<p>ANSI N18.7 5.3.8 Chemical-Radiochemical Control Procedures. Procedures shall be provided for chemical and radiochemical control activities. They should include, for example, the nature and frequency of sampling and analyses; instructions for maintaining coolant quality within prescribed limits; and limitations on concentrations of agents that could cause corrosive attack, foul heat transfer surfaces or become sources of radiation hazards due to activation.</p> <p>Procedures shall also be provided for the control, treatment and management of radioactive wastes and control of radioactive calibration sources.</p>		<p>No similar specifics in NQA-1. Addressed in the QAPD.</p>
<p>ANSI N18.7 5.3.9 Emergency Procedures. Procedures shall be provided to guide operations during potential emergencies. They shall be written so that a trained operator will know in advance the expected course of events that will identify an emergency and the immediate action he should take. Since emergencies may not follow anticipated patterns, the procedures should provide sufficient flexibility to accommodate variations.</p> <p>Emergency procedures that cover actions for manipulations of controls to prevent accidents or lessen their consequences should be based on a general sequence of observations and actions. Emphasis should be placed on operator responses to observations and</p>		<p>No similar specifics in NQA-1. Addressed in the QAPD in accordance with current requirements for these type procedures.</p>

CRITERION 5 ANSI N45.2 § 6 - ANSI N18.7	BASIC REQUIREMENT 5 NQA-1 1994	COMMENTS
<p>indications in the control room; that is, when immediate operator actions are required to prevent or mitigate the consequences of a serious condition, procedures should require that those actions be implemented promptly . The emergency procedure format given in 5.3.9.1 provides a basis for coping with emergencies and is an acceptable format for prescribing operator observations and actions. Emergency procedures may contain supplemental background information to further aid operators in taking proper emergency actions, but this information shall be separated from the procedural actions.</p> <p>It is extremely difficult to distinguish between procedures prepared for the purpose of correcting off-normal conditions which in themselves do not constitutes actual emergency situations, but which conceivably can degenerate into true emergencies in the absence of positive corrective action and procedures required for coping with true emergencies that have already occurred. Some owner organizations choose the term "Off-normal Procedures" for the same purpose that others choose "Emergency Procedures." When initially available intelligence provided to operating personnel via instrument readings, physical conditions, and personal observations may not clearly indicate the difference between a simple operational problem and a serious emergency, the actions outlined in the emergency procedures shall be based on a conservative course of action by the operating crew. Considerable judgment on the part of competent personnel is required before departing from the emergency procedure.</p> <p>(17) With regard to Section 5.3.9 of ANSI N18.7-1976, titled Emergency Procedure: As directed by the NRC, the Company follows a format for emergency procedures which is "symptom" based as opposed to "event" based as stipulated in Section 5.3.9.1. Since the Company has these "symptom" based procedures; "event" based procedures are not normally provided.</p>		
ANSI N18.7 5.3.9.1 Emergency Procedure Format and		No similar specifics in NQA-1. Addressed

CRITERION 5 ANSI N45.2 § 6 - ANSI N18.7	BASIC REQUIREMENT 5 NQA-1 1994	COMMENTS
<p>Content. Emergency procedures shall include, as appropriate, the following elements:</p> <p>(1) Title. The title should be descriptive of the emergency for which the procedure is provided.</p> <p>(2) Symptoms. Symptoms should be included to aid in the identification of the emergency. They should include alarms, operating conditions and probable magnitudes of parameter changes. If a condition is peculiar only to the emergency under consideration, it should be listed first</p> <p>(3) Automatic Actions. The automatic actions that will probably occur as a result of the emergency should be identified.</p> <p>(4) Immediate Operator Actions. These steps should specify immediate actions for operation of controls or confirmation of automatic actions that are required to stop the degradation of conditions and mitigate their consequences. Examples include the following: (a) The verification of automatic actions. This step is based on equipment operating as designed and the sequence of events following an expected course. Since variations from the expected course may occur, operators should be prepared to manipulate controls as necessary to cope with the problem. However, the procedure should caution the operator not to place systems in "manual" unless misoperation in "automatic" is apparent and should require him to make frequent checks for proper operation of systems placed in manual control. (b) Assurance that reactor is in a safe condition. This step usually means shutdown of the reactor with sufficient reactivity margin and establishment of required core cooling. (c) Notification to plant personnel of the nature of the emergency. (d) Determination that the reactor coolant system pressure boundary is intact. (e) Confirmation of the availability of adequate power sources. (f) Confirmation that containment and exhaust systems are operating properly in order to prevent uncontrolled release of radioactivity.</p>		<p>in the QAPD in accordance with the current requirements for these type procedures.</p>

<p align="center">CRITERION 5 ANSI N45.2 § 6 - ANSI N18.7</p>	<p align="center">BASIC REQUIREMENT 5 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>(5) Subsequent Operator Actions. Steps should be included to return the reactor to a normal condition or to provide for a safe extended shutdown period under abnormal or emergency conditions.</p> <p>5.3.9.2 Events of Potential Emergency. Potential emergency conditions shall be identified and procedures for coping with them shall be prepared. The following categories of events may, depending upon the design of the plant, be considered as examples of potential emergencies for which procedures are written and for which immediate action is indicated:</p> <ul style="list-style-type: none"> (1) Loss of coolant from identified and unidentified sources, from small loss to design-basis-accident loss (2) Reactor transients and excursions (3) Failure of vital equipment (4) Loss or degradation of vital power sources (5) Civil disturbances (6) Abnormally high radiation levels (7) Excessive release of radioactive liquid or gaseous effluent (8) Malfunction of reactivity control system (9) Loss of containment integrity (10) Conditions that require use of standby liquid poison systems (11) Possible natural occurrences (12) Fires <p>(18) With regard to Section 5.3.9.2 of ANSI N18.7-1976, titled Events of Potential Emergency: The Company will interpret item (11) to mean the natural occurrences which have been evaluated in the UFSAR for the individual nuclear facility</p> <p>5.3.9.3 Procedures for Implementing Emergency Plan. Implementing procedures for emergency plan actions shall contain, as appropriate, the following elements:</p> <ul style="list-style-type: none"> (1) Individual assignment of authorities and responsibilities for performance of specific tasks to specific individuals or staff positions. (2) Protective action levels and protective 		

CRITERION 5 ANSI N45.2 § 6 - ANSI N18.7	BASIC REQUIREMENT 5 NQA-1 1994	COMMENTS
<p>measures outlined for the emergency identified.</p> <p>(3) Specific actions to be taken by coordinating support groups.</p> <p>(4) Procedures for medical treatment and handling of contaminated individuals.</p> <p>(5) Special equipment requirements for items such as medical treatment, emergency personnel removal, specific radiation detection, personnel dosimetry and rescue operations, procedures for making this equipment available, plus operating instructions for such equipment, and provisions for its periodic inspection and maintenance.</p> <p>(6) Identification of emergency communications network, including communications required for personnel identification and effective coordination of all support groups.</p> <p>(7) Description of alarm signals in each facility. At sites with multiple units, alarm signals should be consistent from one unit to another. (Signals for initiating protective measures should be clear and distinct from process or operational alarm system to avoid confusion.)</p> <p>(8) Procedures required to restore the plant to normal conditions following an emergency.</p> <p>(9) Requirements for periodically testing of procedures, communications network and alarm systems to assure that they function properly.</p> <p>5.3.9.3 See also U.S. Nuclear Regulatory Commission (NRC) "Guide to the Preparation of Emergency Plans for Production and Utilization Facilities." (19) With regard to Section 5.3.9.3 of ANSI N18.7-1976, titled Procedures for Implementing Emergency Plan: The Company's NRC accepted Emergency Plan for each nuclear facility will be implemented in lieu of the requirements in this Section.</p>		
<p>ANSI N18.7 5.3.10 Test and Inspection Procedures. Test and inspection procedures shall contain a description of objectives; acceptance criteria that will be</p>		<p>No similar specifics in NQA-1. Addressed in the QAPD.</p>

CRITERION 5 ANSI N45.2 § 6 - ANSI N18.7	BASIC REQUIREMENT 5 NQA-1 1994	COMMENTS
<p>used to evaluate the results; prerequisites for performing the tests or inspections including any special conditions to be used to simulate normal or abnormal operating conditions; limiting conditions; and the test or inspection procedure. These procedures shall also specify any special equipment or calibrations required to conduct the test or inspection. Test and inspection results shall be documented and evaluated by responsible authority to assure that test and inspection requirements have been satisfied.</p> <p>Where tests and inspections are to be witnessed, the procedure shall identify hold points in the testing sequence to permit witnessing. The procedure shall require appropriate approval for the work to continue beyond the designated hold point. The test and inspection procedures shall require recording the date, identification of those performing the test or inspection, as-found condition, corrective actions performed, if any, and as-left condition.</p>		

CRITERION 6 ANSI 45.2 §7 – ANSI N18.7 § 5.2.15	BASIC REQUIREMENT 6 NQA-1 1994	COMMENTS
<p>N45.2 DOCUMENT CONTROL Measures shall be established and documented to control the issuance of documents, such as instructions, procedures, and drawings, including changes thereto, which prescribe activities affecting quality.</p> <p>ANSI N18.7-5.2.15 The administrative controls and quality assurance program shall provide measures to control and coordinate the approval and issuance of documents, including changes thereto, which prescribe all activities affecting quality. Such documents include those which describe organizational interfaces, or which prescribe activities affecting safety-related structures, systems, or components. These documents also include operating and special orders, operating procedures, test procedures, equipment control procedures, maintenance or modification procedures, refueling, and material control procedures.</p>	<p>The preparation, issue, and change of documents that specify quality requirements or prescribe activities affecting quality shall be controlled to assure that correct documents are being employed.</p>	<p>Similar requirement. ANSI N18.7 contains some additional information regarding Document control that is not reflected in the basic or supplemental requirements of NQA-1. Recommend incorporating this information into the QAPD and eliminate any commitment to N18.7.</p>
<p>N 45.2 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.</p> <p>ANSI N18.7-5.2.15 These measures shall assure that documents, including revisions or changes, are reviewed for adequacy by appropriately qualified personnel and approved for release by authorized personnel; and are distributed in accordance with current distribution lists and used by the personnel performing the prescribed activity, and that procedures are provided to avoid the misuse of outdated or inappropriate documents.</p> <p>Procedures for operational phase activities of a nuclear power plant reflect the conditions that exist at the time the procedures are written. These conditions include the technical information available, industry experience, and in the case of the initial procedures for a new plant, assumptions made</p>	<p>Such documents, including changes thereto, shall be reviewed for adequacy and approved for release by authorized personnel.</p>	<p>Similar requirement. N18.7 has more detailed review requirements. The QAPD has met the intent of N18.7 through the modified review programs that had previously been established at the sites in lieu of the specific review periodicity defined in N18.7 (biennial review). The Millstone and the North Anna/Surry review programs are continued through the new QAPD and a biennial review for all procedures is not committed to in the new program. Regulatory requirements for specific reviews will continue to be met.</p>

CRITERION 6 ANSI 45.2 §7 – ANSI N18.7 § 5.2.15	BASIC REQUIREMENT 6 NQA-1 1994	COMMENTS
<p>regarding the detailed behavior of the plant that may not be fully known prior to operation. In order to ensure that the procedures in current use provide the best possible instructions for performance of the work involved, systematic review and feedback of information based on use is required.</p> <p>Each procedure shall be reviewed and approved prior to initial use. The frequency of subsequent reviews shall be specified and may vary depending on the type and complexity of the activity involved, and may vary with time as a given plant reaches operational maturity. Applicable procedures shall be reviewed following an unusual incident, such as an accident, an unexpected transient, significant operator error, or equipment malfunction.</p> <p>Applicable procedures shall be reviewed following any modification to a system.</p> <p>Plant procedures shall be reviewed by an individual knowledgeable in the area affected by the procedure no less frequently than every two years to determine if changes are necessary or desirable. A revision of a procedure constitutes a procedure review.</p> <p>Procedures shall be approved as designated by the owner organization before initial use. Rules shall be established which clearly delineate the review of procedures by knowledgeable personnel other than the originator and the approval of procedures and procedure changes by authorized individuals.</p> <p>The following exception is in the Current MP QAPD: <u>ANSI N18.7-1976</u>, Paragraph 5.2.15, "Review, Approval, and Control of Procedures," states in part: "Plant procedures shall be reviewed by an individual knowledgeable in the area affected by the procedure no less frequently than every two years to determine if changes are necessary or desirable."</p> <p>The licensee implements administrative and programmatic controls that ensure procedures are maintained current in accordance with 10CFR50,</p>		

<p align="center">CRITERION 6 ANSI 45.2 §7 – ANSI N18.7 § 5.2.15</p>	<p align="center">BASIC REQUIREMENT 6 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>Appendix B, thus meeting the intent of the biennial review.</p> <p>The licensee implements administrative controls to perform biennial reviews of non-routine procedures such as Emergency Operating Procedures (EOP's), Abnormal Operating Procedures (AOP's), Off Normal Procedures (ONP's), Emergency Plan, Security and other procedures that may be dictated by an event.</p> <p>Programmatic controls specify conditions when the mandatory review of plant procedures apply, and include a requirement to review applicable procedures following an accident or transient and following any modification to a system.</p> <p>The licensee utilizes a pre-job briefing practice to ensure that personnel are aware of what is to be accomplished and what procedures will be used prior to beginning a job. In addition, the Procedure Compliance Policy requires that the job be stopped and the procedure be revised or the situation resolved prior to work continuing if procedures cannot be implemented as written.</p> <p>Additionally, the licensee's Quality Assurance Program requires the review of a representative sample of plant procedures as part of routine audits and surveillances to ensure that existing administrative controls for procedure verification, review and revision are effective in maintaining the quality of plant procedures. Significant procedural deficiencies are identified and corrected through the Station Corrective Action Program. The Station Self-Assessment Program also periodically reviews selected procedures and identifies deficiencies and improvements through the Corrective Action Program.</p> <p>The following clarification is in the Current VA QAPD: (15) With regard to Section 5.2.15 of ANSI N18.7-1976, titled Review, Approval and Control of Procedures: The third sentence in paragraph</p>		

CRITERION 6 ANSI 45.2 §7 – ANSI N18.7 § 5.2.15	BASIC REQUIREMENT 6 NQA-1 1994	COMMENTS
<p>three is interpreted to mean: Applicable procedures, as determined by Station Management, shall be reviewed following an accident, an unexpected transient, significant operator error or equipment malfunction. The first sentence of the fourth paragraph is considered to be met via procedure reviews as described by administrative procedures. Additional procedure review, approval, and control requirements/exceptions are discussed in Section 17.2.5. above. The biennial review requirement is deleted. The procedures upgrade program provides a systematic and effective process for developing and revising procedures which encompasses the intent of the biennial review.</p>		
	SUPPLEMENT 6S-1 Supplementary Requirements For Document Control	
	1 GENERAL	
	This Supplement provides amplified requirements for a document control system.	
	It supplements the requirements of Basic Requirement 6 of this Part (Part I) and shall be used in conjunction with that Basic Requirement when and to the extent specified by the organization invoking this Part (Part I).	
	The documents which shall be controlled in accordance with this Supplement are only those documents which specify quality requirements or prescribe activities affecting quality such as instructions, procedures, and drawings.	NQA 1-1994 added a requirement that describes what falls under the document control supplement.
	The term <i>document control</i> used throughout this Supplement is defined as the act of assuring that documents are reviewed for adequacy, approved for release by authorized personnel, and distributed to and used at the location where the prescribed activity is performed.	NQA 1-1994 Added language to bound and limit what falls under document control.
	2 DOCUMENT PREPARATION, REVIEW, APPROVAL, AND ISSUANCE	
N 45.2 Those participating in an activity shall be made aware of and use proper and current		General language that meets the intent of N18.7 has been included in Section 6 of

CRITERION 6 ANSI 45.2 §7 – ANSI N18.7 § 5.2.15	BASIC REQUIREMENT 6 NQA-1 1994	COMMENTS
<p>instructions, procedures, drawings, and engineering requirements for performing the activity. Participating organizations shall have procedures for control of the documents and changes thereto to preclude the possibility of use of outdated or inappropriate documents.</p> <p>ANSI N18.7-5.2.15 Those participating in any activity shall be made aware of, and use, proper and current instructions, procedures, drawings, and engineering requirements for performing the activity. Participating organizations shall have procedures for control of the documents and changes thereto to preclude the possibility or use of outdated or inappropriate documents.</p>		<p>the QAPD.</p>
<p>N 45.2 Document control measures shall provide for: (1) identification of individuals or organizations responsible for preparing, reviewing, approving, and issuing documents and revisions thereto; (2) identifying the proper documents to be used in performing the activity; (3) coordination and control of interface documents; (4) ascertaining that proper documents are being used; (5) establishing current and updated distribution lists.</p> <p>ANSI N18.7-5.2.15 Document control measures shall provide for: (1) Identification of individuals or organizations responsible for preparing, reviewing, approving, and issuing documents and revisions thereto; (2) Identifying the proper documents to be used in performing the activity; (3) Coordination and control of interface documents; (4) Ascertaining that proper documents are being used; (5) Establishing current and updated distribution lists.</p>	<p>The control system shall be documented and shall provide for (a) through (c) below:</p> <p>(a) identification of documents to be controlled and their specified distribution;</p> <p>(b) identification of assignment of responsibility for preparing, reviewing, approving, and issuing documents;</p> <p>(c) review of documents for adequacy, completeness, and correctness prior to approval and issuance.</p>	<p>Similar requirement. NQA-1 is not as detailed.</p>
	<p>3 DOCUMENT CHANGES</p>	
	<p>3.1 Major Changes</p>	
<p>N 45.2 Changes to documents shall be reviewed and approved by the same organizations that performed the original review and approval unless other</p>	<p>Changes to documents, other than those defined as minor changes in para. 3.2 below, are considered as major changes and shall be reviewed and approved by the same</p>	<p>Similar requirements</p>

CRITERION 6 ANSI 45.2 §7 – ANSI N18.7 § 5.2.15	BASIC REQUIREMENT 6 NQA-1 1994	COMMENTS
<p>organizations are specifically designated. ANSI N18.7-5.2.15 Changes to documents shall be reviewed and approved by the same organizations that perform the original review and approval unless the owner organization designates another qualified organization.</p>	<p>organizations that performed the original review and approval unless other organizations are specifically designated.</p>	
<p>N 45.2 The reviewing organizations shall have access to pertinent background information upon which to base its approval and shall have adequate understanding of the requirements and intent of the original document. ANSI N18.7-5.2.15 The reviewing organizations shall have access to pertinent background information upon which to base its approval and shall have adequate understanding of requirements and intent of the original document.</p>	<p>The reviewing organization shall have access to pertinent background data or information upon which to base their approval.</p>	<p>Similar requirements</p>
	<p>3.2 Minor Changes</p>	
	<p>Minor changes to documents, such as inconsequential editorial corrections, shall not require that the revised documents receive the same review and approval as the original documents.</p>	<p>Additional requirement.</p>
	<p>To avoid a possible omission of a required review, the type of minor changes that do not require such a review and approval and the persons who can authorize such a decision shall be clearly delineated.</p>	<p>Additional requirement.</p>

CRITERION 7 ANSI N45.2 – ANSI N45.2.13 – ANSI N18.7	BASIC REQUIREMENT 7 NQA-1 1994	COMMENTS
N45.2 § 8 and N18.7 § 5.2.13.2, unless otherwise noted.		
<p>N45.2 Measures shall be established and documented to assure that purchased items and services, whether purchased directly or through contractors, conform to the procurement documents.</p> <p>N18.7 Measures shall be provided to assure that purchased items and services, whether purchased directly or through contractors, conform to the procurement documents.</p>	The procurement of items and services shall be controlled to assure conformance with specified requirements.	Similar requirement.
<p>N45.2 These measures shall include provisions, as appropriate, for source evaluation and selection, objective evidence of quality furnished by the contractor, inspection and audit at the source, and examination of items upon delivery.</p> <p>N18.7 These measures shall include provisions, as appropriate, for source evaluation and selection, objective evidence of quality furnished by the contractor, inspection and audit at the source and examination of items upon delivery.</p>	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.	Similar requirement.
	SUPPLEMENT 7S-1, SUPPLEMENTARY REQUIREMENTS FOR CONTROL OF PURCHASED ITEMS AND SERVICES	
	1 GENERAL	
<p>N45.2.13 § 1.1 Scope This standard describes requirements and provides guidelines for the control of activities to be exercised during procurement of items and services which affect the quality of nuclear power plants. These requirements and guidelines apply to procurement activities for items and services such as designing, purchasing, fabricating, handling, shipping, storing, cleaning, constructing, erecting, installing, inspecting, testing, maintaining, repairing, initial fueling, refueling, and modifying. This standard provides guidelines for application of quality assurance, program requirements listed in ANSI N45.2 for various types of procurement such as; total system supply, hardware, services, or a combination thereof. This standard applies to the work of any individual or organization participating in the procurement of those</p>	This Supplement provides amplified requirements for control of purchased items and services. It supplements the requirements of Basic Requirement 7 of this Part (Part 1) and shall be used in conjunction with that Basic Requirement when and to the extent specified by the organization invoking this Part (Part 1). This Supplement includes requirements for source selection, bid evaluation, Supplier performance evaluation, and verification of conformance.	<p>NQA-1 addresses applicability of the standard in the introduction to Part I. This edition does not contain the limits on use with ASME III and XI code requirements; therefore, the NRC regulatory position (C.2) is addressed.</p> <p>The quality assurance requirements of the Dominion program, including the standards of NQA-1, would be used for all activities, including ASME III and XI activities and would supplement any specific quality requirements those codes invoke.</p> <p>The NRC regulatory position (C.5) is addressed by exception. No exception</p>

CRITERION 7 ANSI N45.2 – ANSI N45.2.13 – ANSI N18.7	BASIC REQUIREMENT 7 NQA-1 1994	COMMENTS
<p>items and services from which satisfactory performance is required. 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 required quality of the items or services purchased.</p> <p>The ASME Boiler & Pressure Vessel Code (hereafter 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 Code requirements. This standard does not, however, apply to activities covered by Section III Divisions I and 2 and Section XI of the Code for those activities covered by the Code.</p> <p>Reg. Guide 1.123 Regulatory Position C.2. Section 1.1 of ANSI N45.2.13-1976 states: "The ASME Boiler & Pressure Vessel Code (hereafter referred to as the Code) as well as other ANSI standards, has been considered in the development of this standard, and this standard is intended to be compatible with Code requirements. This standard does not, however, apply to activities covered by Section III, Divisions 1 and 2, and Section XI of the Code for those activities covered by the Code." While Section III, Division 1 and 2, and Section XI (which addresses the control of spare and replacement parts) of the ASME Boiler and Pressure Vessel Code address general requirements for control of procurement of items and services for nuclear power plants, these sections do not explicitly address all the activities described in the ANSI N45.2.13-1976 standard. ANSI N45.2.13-1976, subject to the exceptions of the regulatory position, should be used in conjunction with the ASME Boiler and Pressure Vessel Code, Section III, Divisions 1 and 2, and Section XI for control of procurement of items and services where the ASME Code does not address the activities covered by ANSI N45.2.13-1976.</p> <p>Reg. Guide 1.123 Regulatory Position C.5. ANSI N45.2.13-1976 addresses the control of procurement of items and services that affect the quality of nuclear power plants, including spare and replacement parts. The</p>		<p>is granted to the purchase of spare or replacement parts. Therefore, these quality assurance requirements would be applied to spare and replacement parts the same as new items.</p>

CRITERION 7 ANSI N45.2 – ANSI N45.2.13 – ANSI N18.7	BASIC REQUIREMENT 7 NQA-1 1994	COMMENTS
standard, however, does not provide "requirements" specific to spare and replacement parts. Section 5.2.13 of ANSI N18.7-1976/ANS 3.2, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants," which is endorsed by Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation)," addresses control of spare and replacement parts during the operations phase of nuclear power plants. As a result, the provisions of Section 5.2.13 of ANSI N18.7-1976 related to control of spare and replacement parts are considered applicable and should be used in conjunction with the provisions of ANSI N45.2.13-1976.		
	2 PROCUREMENT PLANNING	
N45.2.13 § 2. PLANNING Measures established for the control of the procurement of items or services shall include planning.	Procurement activities shall be planned and documented to assure a systematic approach to the procurement process.	Similar requirement.
N45.2.13 § 2 - Control of the procurement process requires the identification of organizations involved in the execution of the activity and the delineation of each organization's responsibility. Planning shall result in the documented identification of methods to be used in procurement activities, sequence of actions and milestones indicating the completion of these activities, and the preparation of applicable procedures prior to the initiation of each individual activity listed below.	Procurement planning shall result in the documented identification of procurement methods and organizational responsibilities.	Similar requirement.
N45.2.13 § 2 - Planning shall determine the following objectives: a. What is to be accomplished. b. Who is to accomplish it. c. How it is to be accomplished. d. When it is to be accomplished.	Planning shall determine the following: (a) what is to be accomplished; (b) who is to accomplish it; (c) how it is to be accomplished; (d) when it is to be accomplished	Similar requirement.
N45.2.13 § 2 - These objectives shall be accomplished as early as practicable and no later than the start of those procurement activities which are required to be controlled, to assure interface compatibility and a uniform approach to the procurement process.	Planning shall be accomplished as early as practicable, and no later than at the start of those procurement activities which are required to be controlled, to assure interface compatibility and a uniform approach to the procurement process.	Similar requirement.
N45.2.13 § 2 - Planning shall provide for the integration		These requirements are addressed by

CRITERION 7 ANSI N45.2 – ANSI N45.2.13 – ANSI N18.7	BASIC REQUIREMENT 7 NQA-1 1994	COMMENTS
<p>of the following:</p> <ul style="list-style-type: none"> a. Procurement Document Preparation, Review and Change Control. b. Selection of Procurement Sources. c. Bid Evaluation and Award. d. Purchaser Control of Supplier Performance. e. Verification (surveillance, inspection, or audit) Activities by Purchaser. f. Control of Nonconformances. g. Corrective Action. h. Acceptance of Item or Service. i. Quality Assurance Records. j. Audit of Procurement Program. <p>Subsequent sections discuss these activities and their control in accordance with the general requirements of ANSI N45.2 (and this standard) in greater detail. These activities shall be capable of being verified and their effectiveness determined by audit. Where any of the procurement activities are delegated or applicable to subtier Suppliers, the appropriate controls and requirements of this standard shall also apply.</p>		<p>Supplement 7S-1 to NQA-1, but this level of detail leading in to the requirements is not used within NQA-1.</p>
	<p>3 SUPPLIER SELECTION</p>	
<p>N45.2 Source inspection or audit shall be performed as necessary to assure the required quality of an item. Source inspection or audit may not be necessary when the quality of the item can be verified by review of test reports, inspection upon receipt, or other means.</p> <p>N18.7 Source inspection or audit shall be performed as necessary to assure the required quality of an item. Source inspection or audit may not be necessary when the quality of the item can be verified by review of test reports, inspection upon receipt, or other means.</p> <p>N45.2.13 § 4. SELECTION OF PROCUREMENT SOURCES - 4.1 General - The selection of Suppliers shall be based on evaluation of their capability to provide items or services in accordance with the requirements of the procurement documents.</p>	<p>3.1 Source Evaluation and Selection</p> <p>The selection of Suppliers shall be based on evaluation of their capability to provide items or services in accordance with the requirements of the procurement documents prior to award of contract.</p>	<p>Similar requirement.</p>
<p>N45.2.13 § 4.2 Selection Measures - Procurement source</p>	<p>Procurement source evaluation and selection measures shall be implemented by the Purchaser and shall provide</p>	<p>Similar requirement.</p>

CRITERION 7 ANSI N45.2 – ANSI N45.2.13 – ANSI N18.7	BASIC REQUIREMENT 7 NQA-1 1994	COMMENTS
evaluation and selection measures shall be adopted by the Purchaser and shall provide for identification of the Purchaser's organizational responsibilities for determining Supplier capability. This may require integrated action involving one or more organizations (e.g., engineering, construction, manufacturing, operations, purchasing, or quality assurance) based upon the item or service being procured.	for identification of the Purchaser's organizational responsibilities for determining Supplier capability.	
<p>N45.2 Measures for evaluation and selection of procurement sources include the use of historical quality performance data, source surveys or audits, or source qualification programs.</p> <p>N18.7 Measures for evaluation and selection of procurement sources include the use of historical quality performance data, source surveys or audits, or source qualification programs.</p> <p>N45.2.13 § 4.2 Methods to be utilized in evaluation of Supplier sources, and the results therefrom, shall be documented and shall include any or all of the following:</p>	Measures for evaluation and selection of procurement sources, and the results therefrom, shall be documented and shall include one or more of (a) through (c) below:	Similar requirement.
<p>N45.2.13 § 4.2 - a. Evaluating the suppliers history of providing a product which performs satisfactory in actual use. Information which should be evaluated should include:</p> <ol style="list-style-type: none"> 1) Experience of users of identical or similar products of the prospective Supplier. 2) Purchaser's records that have been accumulated in connection with previous procurement actions and product operating experience. <p>Quality performance is highly dependent upon the Supplier's personnel capabilities, physical conditions of the manufacturing factory and equipment, and management attitude towards quality. Historical data should be representative of the Supplier's current capability. If there has been no recent experience with the Supplier, or if he is a new Supplier, the prospective Supplier shall be requested to submit information on a similar item or service for evidence of his current capabilities.</p> <p>Reg. Guide 1.123 Regulatory Position C.6 In addition to</p>	(a) evaluation of the Supplier's history of providing an identical or similar product which performs satisfactorily in actual use. The Supplier's history shall reflect current capability.	Similar requirement. This addresses NRC Regulatory Position C.6.a. Other details of items 1, 2 and the subsequent paragraph in N45.2.13 are guidance and are addressed as nonmandatory guidance in Appendix 7A-1 of NQA-1 §2.1.

CRITERION 7 ANSI N45.2 – ANSI N45.2.13 – ANSI N18.7	BASIC REQUIREMENT 7 NQA-1 1994	COMMENTS
<p>the requirements of the standard, the guidelines (indicated by the verb "should") identified below are considered to have sufficient safety importance to be treated the same as the requirements of the standard. - a. Section 4.2.a - The guidelines used in evaluating the Supplier's history of providing a product that performs satisfactorily in actual use.</p>		
<p>N45.2.13 § 4.2 - b. The Supplier's current quality records supported by documented qualitative and quantitative information which can be objectively evaluated. This would include review and evaluation of the Supplier's Quality Assurance Program, Manual, and Procedures, as appropriate.</p>	<p>(b) Supplier's current quality records supported by documented qualitative and quantitative information which can be objectively evaluated;</p>	<p>Similar requirement.</p>
<p>N45.2.13 § 4.2 - c. The Supplier's technical and quality capability as determined by a direct evaluation of his facilities and personnel, and the implementation of his quality assurance program.</p>	<p>(c) Supplier's technical and quality capability as determined by a direct evaluation of his facilities and personnel and the implementation of his quality assurance program.</p>	<p>Similar requirement.</p>
<p>N45.2.13 § 5. BID EVALUATION AND AWARD 5.1 General - A documented system for reviewing and evaluating the bids and awarding of contracts shall be established by the Purchaser.</p>	<p>4 BID EVALUATION</p>	<p>Requirement addressed through the following statements.</p>
<p>N45.2.13 § 5.2 Conformance to Procurement Document The Purchaser shall establish measures to assure that the bid conforms to the procurement document requirements. The bid evaluation shall be made by individuals or organizations designated to evaluate the following subjects, as applicable to the type of procurement:</p> <ul style="list-style-type: none"> a. Technical considerations. b. Quality assurance requirements. c. Research and development effort. d. Suppliers' Personnel. e. Suppliers' production capability. f. Suppliers' past performance. g. Alternates. h. Exceptions. <p>Other considerations such as warranties, schedule, price, price adjustments commercial terms and conditions, although not quality related, are recognized as factors</p>	<p>Bid evaluation shall determine the extent of conformance to the procurement documents. This evaluation shall be performed by individuals or organizations designated to evaluate the following subjects, as applicable to the type of procurement:</p> <ul style="list-style-type: none"> (a) technical considerations (b) quality assurance requirements (c) Supplier's personnel (d) Supplier's production capability (e) Supplier's past performance (f) alternates (g) exceptions 	<p>Similar requirement. NQA-1 does not address research and development effort as a factor in bid evaluation. This would be covered by evaluation of a Supplier's technical considerations. NQA-1 does not address those items that are not considered quality related.</p>

CRITERION 7 ANSI N45.2 – ANSI N45.2.13 – ANSI N18.7	BASIC REQUIREMENT 7 NQA-1 1994	COMMENTS
affecting bid evaluation.		
N45.2.13 § 5.3 Preaward Evaluation - Prior to the award of the contract, the Purchaser shall have performed a preaward evaluation of the Supplier as described in Section 4.2 of this standard.		Addressed in section 3 of this supplement to NQA-1.
N45.2.13 § 5.4 Award - Prior to the award of the contract, the Purchaser shall also resolve or obtain commitments to resolve unacceptable conditions resulting from the bid evaluation.	Prior to the award of the contract, the Purchaser shall resolve or obtain commitments to resolve unacceptable quality conditions resulting from the bid evaluation.	Similar requirement.
	5 SUPPLIER PERFORMANCE EVALUATION	
N45.2.13 § 6. PURCHASER EVALUATION OF SUPPLIER PERFORMANCE 6.1 General - Purchasers at all tiers shall retain the responsibility of monitoring and evaluating Supplier performance to the specified requirements of the procurement document. In exercising this responsibility, the Purchaser of items and services shall establish measures to verify Supplier's performance. As deemed necessary by the Purchaser, the methods shall include:	The Purchaser of items and services shall establish measures to interface with the Supplier and to verify Supplier's performance as deemed necessary by the Purchaser. The measures shall include (a) through (f) below:	Similar requirement.
N45.2.13 § 6.1 - a. Establishing an understanding between Purchaser and Supplier of the provisions and specifications of the procurement documents.	(a) establishing an understanding between Purchaser and Supplier of the provisions and specifications of the procurement documents;	Similar requirement.
N45.2.13 § 6.1 - b. Requiring the Supplier to identify planning techniques and processes to be utilized in fulfilling procurement document requirements.	(b) requiring the Supplier to identify planning techniques and processes to be utilized in fulfilling procurement document requirements;	Similar requirement.
N45.2.13 § 6.1 - c. Reviewing documents which are generated or processed during activities fulfilling procurement requirements.	(c) reviewing Supplier documents which are generated or processed during activities fulfilling procurement requirements;	Similar requirement.
N45.2.13 § 6.1 - d. Identifying and processing necessary change information.	(d) identifying and processing necessary change information;	Similar requirement.
N45.2.13 § 6.1 - e. Establishing exchange method of document information between Purchaser and Supplier.	(e) establishing method of document information exchange between Purchaser and Supplier;	Similar requirement.
N45.2.13 § 6.2 Planning and Coordination – (3 rd sentence) Purchaser notification points, including hold and witness points, should be identified and documented based upon mutual agreement between Purchaser and Supplier. Reg. Guide 1.123 Regulatory Position C.6 In addition to the requirements of the standard, the guidelines (indicated	(f) establishing the extent of source surveillance and inspection activities.	Similar requirement. This addresses the NRC Regulatory Position C.6.b

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<p>by the verb "should") identified below are considered to have sufficient safety importance to be treated the same as the requirements of the standard. - b. Section 6.2 - The guideline concerning purchaser notification points as part of pre-and post-award activities.</p>		
<p>N45.2.13 § 6.2 Planning and Coordination – (4th sentence) These activities shall be implemented as early as practicable in the procurement process. N45.2.13 § 7.1 - These verification activities shall be conducted as early as practicable to preclude subsequent activities from preventing disclosure of deficiencies.</p>	<p>These verification activities shall be conducted as early as practicable.</p>	<p>Similar requirement.</p>
<p>N45.2.13 § 7.1 - The Purchaser's verification activities are not intended to relieve the Supplier of his responsibilities for verification of quality requirements.</p>	<p>The Purchaser's verification activities, however, shall not relieve the Supplier of his responsibilities for verification of quality achievement.</p>	<p>Similar requirement.</p>
<p>6.2 Planning and Coordination Depending on the complexity or scope of the item or service, the Purchaser shall initiate pre- and post-award activities. These activities may take the form of meetings or other forms of communication to establish an understanding between the Purchaser and Supplier of the procurement requirements; the intent of the Purchaser in monitoring and evaluating the Supplier's performance; and the planning, manufacturing techniques, tests, inspections, and processes to be employed by the Supplier in meeting procurement requirements. Purchaser notification points, including hold and witness points, should be identified and documented based upon mutual agreement between Purchaser and Supplier. These activities shall be implemented as early as practicable in the procurement process. The depth and necessity of pre- and post-award activity depends on the uniqueness, complexity, procurement frequency with the same Supplier and past Supplier performance for the specific items or services covered by the procurement document.</p>		<p>These requirements are contained as nonmandatory guidance in NQA-1, Appendix 7A-1 § 3.</p>
	<p>5.1 Extent of Activities</p>	
<p>N45.2.13 § 7.2 Planning - Planning shall be an integral part of verification activities. The extent of verification activities, including planning, shall be a function of the</p>	<p>The extent of verification activities, including planning, shall be a function of the relative importance, complexity, and quantity of the item or services procured and the</p>	<p>Similar requirement.</p>

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<p>relative importance, complexity, and quantity of the item procured and the Supplier's quality performance. See Section 10 of this standard for guidance in selecting verification methods.</p> <p>N45.2.13 § 7.2.1 Source Verification Planning. The verification activity plans shall, relative to fabrication sequence and assembly processes, identify the appropriate inspections, tests, prerequisites and inspection sequence, hold and witness points, acceptance criteria, and the documentation required by the procurement document.</p>	<p>Supplier's quality performance.</p>	
<p>N45.2.13 § 7.1 - Purchaser verification activities shall be accomplished by qualified personnel assigned to check, inspect, audit or witness the activities of Suppliers.</p>	<p>Verification activities shall be accomplished by qualified personnel assigned to check, inspect, audit, or witness the activities of Suppliers.</p>	<p>Similar requirement.</p>
<p>N45.2 The effectiveness of the control of quality shall be assessed by the purchaser at intervals consistent with the importance, complexity, and quality of the item or service.</p> <p>N18.7 The effectiveness of the control of quality shall be assessed by the purchaser at intervals consistent with the importance, complexity and quality of the item or service.</p> <p>N45.2.13 § 11. QUALITY ASSURANCE RECORDS Measures shall be established and implemented for the control of:</p> <p>a. Supplier-generated documents and records that are required to be submitted to the Purchaser or retained by the Supplier as specified by the procurement documents.</p> <p>b. Purchaser-generated quality related documents and records.</p> <p>The collection, storage, and maintenance of quality assurance records shall be in accordance with ANSI N45.2.9.</p>	<p>5.2 Records</p> <p>Activities performed to verify conformance to requirements of procurement documents shall be recorded. Source surveillances and inspections, audits, receiving inspections, nonconformances, dispositions, waivers, and corrective actions shall be documented.</p> <p>The Purchaser shall assure that his documentation is evaluated to determine the Supplier's quality assurance program effectiveness.</p>	<p>Similar requirement.</p> <p>NQA-1 further addresses records in Basic Requirement 17 and Supplement 17S-1.</p>
	<p>6 CONTROL OF SUPPLIER GENERATED DOCUMENTS</p>	
<p>N45.2 This documentary evidence shall be retained at the nuclear facility site and shall be sufficient to identify the specific requirements such as codes, standards, and specifications met by the purchased item.</p> <p>N18.7 This documentary evidence shall be retrievable and</p>	<p>Supplier generated documents shall be controlled, handled, and approved in accordance with established methods. Means shall be implemented to assure that the submittal of these documents is accomplished in accordance with the procurement document requirements.</p>	<p>Similar requirement.</p>

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<p>shall be sufficient to identify the specific requirements such as codes, standards and specifications met by the purchased item.</p> <p>N45.2.13 § 6.3 Control of Supplier Generated Documents - The Purchaser and Supplier shall assure that established measures for the control, handling and approval of Supplier generated documents are implemented, and that the submittal time and frequency for these documents is accomplished in accordance with the procurement documents. These measures shall provide for the acquisition, processing and recorded evaluation of inspection and test data against acceptance criteria.</p>	<p>These measures shall provide for the acquisition, processing, and recorded evaluation of technical, inspection, and test data against acceptance criteria.</p>	
	7 CONTROL OF CHANGES IN ITEMS OR SERVICES	
<p>N45.2.13 § 6.4 Control of Changes in items or Services - The Purchaser and Supplier shall assure that measures to control changes in procurement documents are established, implemented and documented, and are in accordance, with ANSI N45.2 Section 7.</p>	<p>The Purchaser and Supplier shall assure that measures to control changes in procurement documents are established, implemented, and documented and are in accordance with this Part (Part I).</p>	<p>Similar requirement. For NQA-1 this is primarily addressed by Basic Requirement 4 and Supplement 4S-1.</p>
<p>N45.2.13 § 10. ACCEPTANCE OF ITEM OR SERVICE</p>	8 ACCEPTANCE OF ITEM OR SERVICE	
	8.1 General	
<p>N45.2 Where required by code, regulation, or contract requirements, documentary evidence that items' conform to procurement requirements shall be available at the nuclear facility site prior to installation or use of such items.</p> <p>N18.7 Where required by code, regulation, or contract requirements, documentary evidence that items conform to procurement requirements shall be available at the nuclear power plant site prior to installation or use of such items.</p> <p>N45.2.13 § 10.1 General - The Purchaser shall establish the method of acceptance of an item or service being furnished by the Supplier. Prior to offering the item or service for acceptance, the Supplier shall verify that the item or service being furnished complies with the procurement requirements. Where required by code, regulation or contract requirement, documentary evidence that items conform to procurement documents shall be available at the nuclear power plant site prior to</p>	<p>Methods shall be established for the acceptance of an item or service being furnished by the Supplier. Prior to offering the item or service for acceptance, the Supplier shall verify that the item or service being furnished complies with the procurement requirements. Where required by code, regulation, or contract requirement, documentary evidence that items conform to procurement documents shall be available at the nuclear facility site prior to installation or use.</p>	<p>Similar requirement. NRC Regulatory Position C.4 from Reg. Guide 1.123 is addressed in NQA-1 § 8.2.3 by requiring receiving inspection to be performed in accordance with established procedures and instructions.</p>

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<p>installation or use of such items regardless of acceptance methods.</p> <p>Reg. Guide 1.123 Regulatory Position C.4. Section 10.1 of ANSI N45.2.13-1976 states that the Purchaser shall establish the method of acceptance of an item or service being furnished by the Supplier. In order for receiving inspection personnel to be aware of what methods of acceptance are established, the applicable portion of the procurement document identifying the method of acceptance of an item or service, or other documents containing the same procurement document information, should be on hand.</p>		
	<p>8.2 Methods of Acceptance</p>	
<p>N45.2 Where not precluded by other requirements, such documentary evidence may take the form of written certifications of conformance which identify the requirements met by the items, provided means are available to verify the validity of such certifications.</p> <p>N18.7 Where not precluded by other requirements, such documentary evidence may take the form of written certifications of conformance which identify the requirements met by the items, provided means are available to verify the validity of such certifications.</p> <p>N45.2.13 § 10.3 Methods of Acceptance, Selection and Implementation - Purchaser methods used to accept an item or service from a Supplier are source verification, receiving inspection, Supplier certificate of conformance, post installation test at the nuclear power plant site, or a combination thereof.</p>	<p>Purchaser methods used to accept an item or related service from a Supplier shall be Supplier Certificate of Conformance, source verification, receiving inspection, or post-installation test at the nuclear facility site, or a combination thereof.</p>	<p>Similar requirement.</p>
<p>N45.2.13 §10.2 Certificate of Conformance - Where not precluded by other requirements, documentary evidence may take the form of written certificates of conformance which identify the requirements met by the items. Where certificates of conformance are used, the following minimum criteria shall be met:</p> <p>Reg. Guide 1.123 Regulatory Position C.6 In addition to the requirements of the standard, the guidelines (indicated by the verb "should") identified below are considered to</p>	<p>8.2.1 Certificate of Conformance. When a Certificate of Conformance is used, the minimum criteria of (a) through (f) below shall be met.</p>	<p>Similar requirement.</p> <p>The NRC Regulatory Position C.6 from Reg. Guide 1.123 has been addressed in NQA-1.</p>

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<p>have sufficient safety importance to be treated the same as the requirements of the standard. - c. Section 10.2 (a through f) - The guidelines that specify the minimum criteria for Certificates of Conformance.</p> <p>N45.2.13 § 10.3.3 Acceptance by Supplier Certificate of Conformance. In certain procurement actions which do not involve direct inspection by the Purchaser, the Purchaser may accept an item or service from a Supplier based only on a Supplier's certificate of conformance that the specified requirements have been met. However, specific supplemental documentation, such as material certificates or reports of tests performed, may be required by procurement documents. Acceptance by this method is satisfactory when the item or service is of simple design and involves standard materials, processes and tests. Such items may be fabricated subject to selected qualification, sample, or batch testing to establish or maintain a minimum quality confidence level.</p>		
<p>N45.2.13 § a. The certificate should identify the purchased material or equipment, such as by the purchase order number.</p>	<p>(a) The certificate shall identify the purchased material or equipment, such as by the purchase order number.</p>	<p>Similar requirement.</p>
<p>N45.2.13 § b. The certificate should identify the specific procurement requirements met by the purchased material or equipment, such as codes, standards, and other specifications. This may be accomplished by including a list of the specific requirements or by providing, onsite, a copy of the purchase order and the procurement specifications or drawings, together with a suitable certificate. The procurement requirements identified should include any approved changes, waivers, or deviations applicable to the subject material or equipment.</p>	<p>(b) The certificate shall identify the specific procurement requirements met by the purchased material or equipment, such as codes, standards, and other specifications. This may be accomplished by including a list of the specific requirements or by providing, on-site, a copy of the purchase order and the procurement specifications or drawings, together with a suitable certificate. The procurement requirements identified shall include any approved changes, waivers, or deviations applicable to the subject material or equipment.</p>	<p>Similar requirement.</p>
<p>N45.2.13 § c. The certificate should identify any procurement requirements that have not been met, together with an explanation and the means for resolving the nonconformances.</p>	<p>(c) The certificate shall identify any procurement requirements that have not been met, together with an explanation and the means for resolving the nonconformances.</p>	<p>Similar requirement.</p>
<p>N45.2.13 § d. The certificate should be attested to by a person who is responsible for this quality assurance function and whose function and position are described in</p>	<p>(d) The certificate shall be signed or otherwise authenticated by a person who is responsible for this quality assurance function and whose function and</p>	<p>Similar requirement.</p>

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the Purchaser's or Supplier's quality assurance program.	position are described in the Purchaser's or Supplier's quality assurance program.	
N45.2.13 § e. The certification system, including the procedures to be followed in filling out a certificate and the administrative Procedures for review and approval of the certificates, should be described in the Purchaser's or Supplier's quality assurance program.	(e) The certification system, including the procedures to be followed in filling out a certificate and the administrative procedures for review and approval of the certificates, shall be described in the Purchaser's or Supplier's quality assurance program.	Similar requirement.
N45.2.13 § f. Means should be provided to verify the validity of Supplier certificates and the effectiveness of the certification system, such as during the performance of audits of the Supplier or independent inspection or test of the items. Such verifications should be conducted by the Purchaser at intervals commensurate with the Supplier's past quality performance. (Section 7 of this standard provides requirements and guidance relative to the conduct of source verification activities and receiving inspections.)	(f) Means shall be provided to verify the validity of Supplier certificates and the effectiveness of the certification system, such as during the performance of audits of the Supplier or independent inspection or test of the items. Such verification shall be conducted by the Purchaser at intervals commensurate with the Supplier's past quality performance.	Similar requirement.
N45.2.13 § 7.3.1 Source Verification Activities. When planning requires Purchaser source surveillance, it shall be implemented to monitor, witness or observe activities. Similarly, source inspection shall be implemented in accordance with plans to perform inspections, examinations, or tests at predetermined points. Source surveillance and inspection may require the assignment of personnel to a Supplier's facilities. N45.2.13 § 10.3.1 Acceptance by Source Verification. Acceptance by source verification should be considered when the item or service is: a. vital to plant safety; or b. difficult to verify quality characteristics after delivery; or c. complex in design, manufacture, and test. The source verification activities should include but not be limited to the following as applicable: a. Documentation has been submitted as required and provides verification of approvals, material, applicable inspections, and tests. b. Fabrication procedures and processes have been	8.2.2 Source Verification. When source verification is used, it shall be performed at intervals consistent with the importance and complexity of the item or service, and it shall be implemented to monitor, witness, or observe activities. Source verification shall be implemented in accordance with plans to perform inspections, examinations, or tests at predetermined points. Upon Purchaser acceptance of source verification, documented evidence of acceptance shall be furnished to the receiving destination of the item, to the Purchaser, and to the Supplier.	Similar requirement.

<p align="center">CRITERION 7 ANSI N45.2 – ANSI N45.2.13 – ANSI N18.7</p>	<p align="center">BASIC REQUIREMENT 7 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>approved and complied with and the applicable qualifications, process records, and certifications are available.</p> <p>c. Components and assemblies have been inspected, examined, and tested as required and applicable inspection, test and certification records are available.</p> <p>d. Nonconformances have been dispositioned as required.</p> <p>e. Components and assemblies are cleaned, preserved, packed and identified in accordance with specified requirements.</p> <p>Upon Purchaser acceptance by source verification, documented evidence of acceptance shall be furnished to the receiving destination of the item, to the Purchaser, and to the Supplier.</p>		
<p>N45.2.13 § 7.2.2 Receiving Inspection Planning. The receiving inspection plans shall identify the characteristics to be verified and documentation to be reviewed at receiving inspection. For characteristics to be considered during receiving inspection, see ANSI N45.2.2.</p> <p>N45.2.13 § 7.3.2 Receiving Inspection. When planning requires Purchaser receiving inspection, it shall be implemented and coordinated with source verifications performed. During receiving inspection, emphasis shall be placed on assuring that items have not sustained damage in shipment that would influence subsequent fabrication, construction, installation, or end use. Sampling may be utilized during receiving inspection when conducted in accordance with established procedures or recognized standards. Receiving inspection measures shall include provisions for receiving documentation (such as drawings, certifications, test results and other materials) offered as objective evidence in satisfaction of requirements. These measures shall also include provisions for dispositioning (i.e., accept, reject or hold) and handling of items received and services performed. See ANSI N45.2.2 for additional requirements.</p> <p>N45.2.13 § 10.3.2 Acceptance by Receiving Inspection. Acceptance solely by receiving inspection is satisfactory when the items or services are</p>	<p>8.2.3 Receiving Inspection. When receiving inspection is used, purchased items shall be inspected as necessary to verify conformance to specified requirements, taking into account source verification and audit activities and the demonstrated quality performance of the Supplier. Receiving inspection shall be performed in accordance with established procedures and inspection instructions, to verify by objective evidence such features as proper configuration; identification; dimensional, physical, and other characteristics; freedom from shipping damage; and cleanliness. Receiving inspection shall be coordinated with review of Supplier documentation when procurement documents require such documentation to be furnished prior to receiving inspection.</p>	<p>Similar requirement. Within NQA-1, Subpart 2.2 is commensurate with ANSI N45.2.2. NRC Regulatory Position C.6 from Reg. Guide 1.123 related to N45.2.13, § 10.3.2 is addressed in the wording of NQA-1.</p>

<p align="center">CRITERION 7 ANSI N45.2 – ANSI N45.2.13 – ANSI N18.7</p>	<p align="center">BASIC REQUIREMENT 7 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>a. relatively simple and standard in design, manufacture, and test; and</p> <p>b. adaptable to standard or automated inspections and/or tests of the end product to verify quality characteristics after delivery; and</p> <p>c. such that receiving inspection does not require operations which could adversely affect the integrity, function, or cleanness of the item.</p> <p>Receiving inspection should be coordinated with review of Supplier documentation when procurement documents require such documentation to be furnished prior to receiving inspection.</p> <p>Reg. Guide 1.123 Regulatory Position C.6 In addition to the requirements of the standard, the guidelines (indicated by the verb "should") identified below are considered to have sufficient safety importance to be treated the same as the requirements of the standard. - d. Section 10.3.2 - The guideline concerning acceptance by receiving inspection.</p>		
<p>N45.2.13 § 10.3.4 Acceptance by Post Installation Test at the Nuclear Power Plant Site. Acceptance by this method is satisfactory when performed following the accomplishment of at least one of the preceding methods and when</p> <p>a. it is difficult to verify the quality characteristics of the item without it being installed and in use; or</p> <p>b. the item requires an integrated system checkout or test with other items to verify its quality characteristics; or</p> <p>c. the item cannot demonstrate its ability to perform its intended function except when in use.</p> <p>Post installation test requirements and acceptance documentation should be mutually established by the Purchaser and Supplier.</p> <p>Reg. Guide 1.123 Regulatory Position C.6 In addition to the requirements of the standard, the guidelines (indicated by the verb "should") identified below are considered to have sufficient safety importance to be treated the same as the requirements of the standard. - e. Section 10.3.4 - The guidelines concerning the establishment of post-installation test requirements and acceptance</p>	<p>8.2.4 Post-Installation Testing. When post-installation testing is used, post-installation test requirements and acceptance documentation shall be mutually established by the Purchaser and Supplier.</p>	<p>Similar requirement.</p> <p>NQA-1 does not address the reasons why a post-installation test would be chosen as the method for acceptance of an item. This is left to the implementing program to determine when to use this testing.</p>

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documentation.		
	8.3 Acceptance of Services Only	
<p>N45.2.13 § 10.3.5 Acceptance of Services Only. The guidelines outlined in Section 10.3 above primarily deal with hardware items and related services. In certain cases involving procurement of services only, such as third party inspection; engineering and consulting services; and installation, repair, overhaul or maintenance work; the Purchaser may accept the service by any or all of the following methods:</p> <p>a. Technical verification of data produced. b. Surveillance and/or audit of the activity. c. Review of objective evidence for conformance to the procurement document requirements such as certifications, stress reports, etc.</p>	<p>In certain cases involving procurement of services only, such as third party inspection; engineering and consulting services; and installation, repair, overhaul, or maintenance work, the Purchaser shall accept the service by any or all of the following methods:</p> <p>(a) technical verification of data produced; (b) surveillance and/or audit of the activity; (c) review of objective evidence for conformance to the procurement document requirements such as certifications, stress reports, etc.</p>	Similar requirement.
N45.2.13 § 8. CONTROL OF NONCONFORMANCES	9 CONTROL OF SUPPLIER NONCONFORMANCES	
<p>N45.2.13 § 8.1 General - The Purchaser and Supplier shall establish and document measures for the identification, control, and disposition of items and services that do not meet procurement document requirements.</p>	<p>The Purchaser and Supplier shall establish and document methods for disposition of items and services that do not meet procurement documentation requirements.</p>	<p>Similar requirement. NQA-1 also addresses Nonconformances under Basic Requirement 15 and Supplement 15S-1.</p>
<p>8.2 Disposition These measures shall contain provision for the following:</p>	<p>These methods shall contain provision for (a) through (e) below:</p>	Similar requirement.
<p>a. Review of nonconforming items.</p>	<p>(a) evaluation of nonconforming items;</p>	Similar requirement.
<p>b. Submittal of nonconformance notice to Purchaser by Supplier as directed by the Purchaser. These submittals shall include Supplier recommended disposition (i.e., "use-as-is" or "repair") and technical justification. Nonconformances to the procurement requirements or Purchaser approved documents and which consist of one or more of the following shall be submitted to the Purchaser for approval of the recommended disposition:</p> <ol style="list-style-type: none"> 1) Technical or material requirement is violated 2) Requirement in Supplier documents, which have been approved by the Purchaser, is violated. 3) Nonconformance cannot be corrected by continuation of the original manufacturing process or by rework. 4) The item does not conform to the original requirement even though the item can be restored to a condition such 	<p>(b) submittal of nonconformance notice to Purchaser by Supplier as directed by the Purchaser. These submittals shall include Supplier-recommended disposition (e.g., use-as-is or repair) and technical justification. Nonconformances to the procurement requirements or Purchaser-approved documents, which consist of one or more of the following, shall be submitted to the Purchaser for approval of the recommended disposition:</p> <ol style="list-style-type: none"> (1) technical or material requirement is violated; (2) requirement in Supplier documents, which has been approved by the Purchaser, is violated; (3) nonconformance cannot be corrected by continuation of the original manufacturing process or by rework; (4) the item does not conform to the original requirement even though the item can be restored to a condition such 	Similar requirement.

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that the capacity of the item to function is unimpaired.	that the capability of the item to function is unimpaired;	
c. Purchaser disposition of Supplier recommendation.	(c) Purchaser disposition of Supplier recommendation;	Similar requirement.
d. Verification of disposition.	(d) verification of the implementation of the disposition;	Similar requirement.
e. Maintenance of records of Supplier nonconformances.	(e) maintenance of records of Supplier-submitted nonconformances.	Similar requirement.
	10 COMMERCIAL GRADE ITEMS	
	Where the design utilizes commercial grade items, the following requirements are an acceptable alternate to other requirements of this Supplement, except as noted in (b) below and the requirements of Supplement 4S-1.	This is a new set of requirements not previously in the N45.2 series standards. The company will commit to meeting Generic Letter 89-02 and EPRI NP-5652 in lieu of these requirements.
	(a) The commercial grade item is identified in an approved design output document. An alternate commercial grade item may be applied, provided the cognizant design organization provides verification that the alternate commercial grade item will perform the intended function and will meet design requirements applicable to both the replaced item and its application.	
	(b) Source evaluation and selection, where determined necessary by the Purchaser based on complexity and importance to safety, shall be in accordance with para. 3.1 of this Supplement.	
	(c) Commercial grade items shall be identified in the purchase order by the manufacturer's published product description (for example, catalog number).	
	(d) After receipt of a commercial grade item, the Purchaser shall determine that: (1) damage was not sustained during shipment; (2) the item received was the item ordered; (3) inspection and/or testing is accomplished, as required by the Purchaser, to assure conformance with the manufacturer's published requirements; (4) documentation, as applicable to the item, was received and is acceptable.	
N45.2.13 § 1.2 Responsibility 1.2.1 General The responsibilities for Purchaser and Supplier are		NQA-1 addresses responsibilities in a general sense within the Introduction, §3, of Part I.

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<p>identified with recognition that an organization can be either a Purchaser or a Supplier depending upon the level of procurement. However, for any given procurement action the organization is one or the other and this standard applies accordingly. For example, an organization may be a supplier but may have to purchase items or services from a subtier level.</p>		
<p>N45.2.13 § 1.2.2 Purchaser's Responsibility</p> <p>a. Establishment and implementation of a procurement control process consistent with the requirements and guidelines of this standard.</p> <p>b. Incorporation of quality assurance program requirements, appropriate to the scope of work, into procurement documents.</p> <p>c. Evaluation of Supplier's quality assurance program to assure that it is appropriate and satisfies the requirements for the items or services being purchased.</p> <p>d. Where interfacing, but separate, procurement actions are initiated by a single Purchaser to purchase the design, manufacture, shop assembly and test, field installation and field test of equipment or a system, the single Purchaser shall assure that the quality assurance requirements incorporated in separate procurement documents, in conjunction with the Purchaser's quality assurance program, will collectively satisfy the requirements of ANSI N45.2 and applicable supplementary standards as applicable to the total items and services procured. An example of this is the case where one Supplier has responsibility for design, manufacture, shop assembly and test; another Supplier has responsibility for field assembly; and a third Supplier has responsibility for field tests.</p>		<p>NQA-1 addresses responsibilities in a general sense within the Introduction, §3, of Part I.</p>
<p>N45.2.13 § 1.2.3 Supplier's Responsibility</p> <p>a. Establish and implement a documented quality assurance program that complies with procurement document requirements.</p> <p>b. Permit Purchaser review of Supplier's quality assurance program and its implementation.</p> <p>c. Incorporate appropriate quality assurance program requirements in subtier procurement documents.</p>		<p>NQA-1 addresses responsibilities in a general sense within the Introduction, §3, of Part I.</p>

CRITERION 7 ANSI N45.2 – ANSI N45.2.13 – ANSI N18.7	BASIC REQUIREMENT 7 NQA-1 1994	COMMENTS
N45.2.13 § 1.3 Definitions The following definitions are provided to assure a uniform understanding of selected terms as they are used in this standard. Other terms and their definitions are contained in ANSI N45.2.10.	The following definitions are from NQA-1, Part I, Introduction	NQA-1 contains definitions in the Introduction to Part I.
N45.2.13 Designated Representative - An individual or organization authorized by the Purchaser to perform functions in the procurement process.		Not defined in NQA-1.
N45.2.13 Procurement Document - Purchase requisitions, purchase orders, drawings, contracts, specifications or instructions used to define requirements for purchase.	Procurement document – purchase requisitions, purchase orders, drawings, contracts, specifications, or instructions used to define requirements for purchase	Same definition.
N45.2.13 Purchaser - The organization responsible for establishment of procurement requirements and for issuance, administration, or both, of procurement documents.	Purchaser – the organization responsible for establishment of procurement requirements and for issuance or administration, or both, of procurement documents	Similar definition.
N45.2.13 Quality Assurance Program Requirements - Those individual requirements listed in ANSI N45.2 which when invoked in total or in part establish the requirements of a quality assurance program.		Not defined in NQA-1.
N45.2.13 Quality Assurance Records - Those records which furnish documentary evidence of the quality of items and of activities affecting quality.	Quality assurance record – a completed document that furnishes evidence of the quality of items and/or activities affecting quality	Similar definition.
N45.2.13 Right of Access - The right of a Purchaser or designated representative to enter the premises of a Supplier for the purpose of inspection, surveillance, or quality assurance audit.	Right of access – the right of a Purchaser or designated representative to enter the premises of a Supplier for the purpose of inspection, surveillance, or quality assurance audit	Similar definition.
N45.2.13 Services - The performance by a Supplier of activities such as design, fabrication, inspection, non-destructive examination, repair, or installation.	Service – the performance of activities such as design, fabrication, inspection, nondestructive examination, repair, or installation	Similar definition.
N45.2.13 Subtier Procurement - Procurement by a Supplier from a subsupplier of items or services		Not defined in NQA-1. Covered by the definition of Supplier.
N45.2.13 Supplier - Any individual or organization who furnishes items or services to a procurement document. It includes the terms Vendor, Seller, Contractor, Subcontractor, Fabricator, Consultant, and subtier levels.	Supplier – any individual or organization who furnishes items or services in accordance with a procurement document. An all-inclusive term used in place of any of the following: vendor, seller, contractor, subcontractor, fabricator, consultant, and their subtier levels.	Similar definition.
N45.2.13 Surveillance - The physical presence to monitor by observation the designated activities to assure that they	Surveillance – the act of monitoring or observing to verify whether an item or activity conforms to specified	Similar definition.

CRITERION 7 ANSI N45.2 – ANSI N45.2.13 – ANSI N18.7	BASIC REQUIREMENT 7 NQA-1 1994	COMMENTS
are performed in a specified manner.	requirements	
<p>N45.2.13 § 1.4 Referenced Documents Documents that are required to be included as part of this standard are identified at the point of reference and described in Section 13 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 13 of this standard unless otherwise specified in the procurement document.</p> <p>Reg. Guide 1.123 Regulatory Position C.1. Section 1.4 of ANSI N45.2.13-1976 states that other documents that are required to be included as part of this standard will be identified at the point of reference and described in Section 13 of the standard. The specific applicability of these listed documents has been or will be covered separately in other regulatory guides or in Commission regulations where appropriate.</p>		No similar statement in this section of NQA-1. As a general statement, will need to include in the QAPD that any referenced documents or standards are considered guidance unless stated otherwise in the QAPD.
<p>N45.2.13 § 7.3.1 ¶ 2 - When conformance to procurement requirements is verified by audit, such audits shall be conducted in accordance with established methods.</p>		Auditing requirements are addressed in NQA-1, Basic Requirement 18, and Supplement 18S-1.
<p>N45.2.13 § 7.4 Measuring and Test Equipment 7.4.1 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.</p> <p>7.4.2 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. If no standards exist, the basis for calibration shall be documented. Records shall be maintained and equipment suitably marked to indicate calibration status or the records shall be traceable to the equipment. When inspection, measuring and test 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</p>		NQA-1 addresses measuring and test equipment in Basic Requirement 12, Supplement 12S-1, and Subpart 2.16.

CRITERION 7 ANSI N45.2 – ANSI N45.2.13 – ANSI N18.7	BASIC REQUIREMENT 7 NQA-1 1994	COMMENTS
inspected or tested.		
N45.2.13 § 7.5 Personnel Qualifications Personnel responsible for performing verification activities shall be qualified in accordance with ANSI N45.2.6 as applicable.		NQA-1 addresses personnel qualifications in Basic Requirement 2, Supplement 2S-1 (inspection and test personnel), and Supplement 2S-3 (audit personnel).
N45.2.13 § 7.6 Reporting Measures shall be established to provide for the reporting of activities performed to verify conformance to requirements of procurement documents. These measures shall include reporting of source surveillances and inspections, audits, receiving inspections, nonconformances, dispositions, waivers, and corrective actions. In addition, the Purchaser shall assure that these reports are evaluated to determine the Supplier's quality assurance program effectiveness.		NQA-1 does not specifically address the reporting of these items in a separate paragraph of this section (Basic Requirement 7 and Supplement 7S-1). However, reporting of these type documents are addressed under the respective sections of the Supplement. Reporting is also addressed in the Requirement and Supplemental sections that would govern these programs, such as Inspections, Tests, and Audits that relate to NQA-1 Requirements 10, 11, and 18.
N45.2.13 § 9. CORRECTIVE ACTION 9.1 General The Purchaser shall establish and document measures that describe the method for the identification of and timely corrective action for conditions adverse to quality which occur during the procurement process and are the responsibility of the Purchaser. 9.2 Significant conditions In the case of significant conditions adverse to quality which may arise during the procurement process, the Purchaser's measures shall describe the method used to: <ol style="list-style-type: none"> a. Identify and document deviations and nonconformances. b. Review and evaluate the conditions to determine the cause, extent, and measures needed to correct and prevent recurrence. c. Report the conditions and corrective action to the appropriate levels of management. d. Assure corrective action is implemented and maintained 		NQA-1 addresses corrective action in Basic Requirement 16.

CRITERION 7 ANSI N45.2 – ANSI N45.2.13 – ANSI N18.7	BASIC REQUIREMENT 7 NQA-1 1994	COMMENTS
<p>as necessary.</p> <p>9.3 Verification - The Purchaser's corrective action measures shall include verification of implementation of Supplier corrective action system. These measures shall determine that conditions adverse to quality such as deficiencies, deviations, defective items and nonconformances have had corrective action implemented and maintained as necessary.</p> <p>Reg. Guide 1.123 Regulatory Position C.3 Section 9.3 of ANSI N45.2.13-1976 states, "The Purchaser's Corrective action measures shall include verification of implementation of Supplier's corrective action system." The Purchaser should verify the implementation of the Supplier's corrective action system when such a system is required, but this verification need not be included as part of the Purchaser's corrective action measures. While Section 9.0 of ANSI N45.2.13-1976 addresses elements of the Purchaser's corrective action system, these same elements are applicable to the Supplier's corrective action system when one is required.</p>		
<p>N45.2.13 § 12. AUDIT OF PROCUREMENT PROGRAM</p> <p>Periodic or random audits shall be performed to verify compliance with procurement activities described in this standard. The scope of planned auditing activity may cover individual operations, events, processes, or the complete quality assurance program. When deemed necessary by the Purchaser, audits of subtier Suppliers shall be carried out to assure that their quality assurance programs on procurement adequately translate the necessary requisites of the governing procurement documents to the items or services involved. The audits shall be conducted in accordance with established methods.</p>		<p>NQA-1 addresses all Quality Assurance auditing under Basic Requirement 18 and Supplement 18S-1.</p>

CRITERION 8 ANSI 45.2-1977, § 9 /N18.7-1976 § 5.2.13.3	BASIC REQUIREMENT 8 NQA-1994	COMMENTS
<p>N45.2 - Measures shall be established and documented for the identification and control of materials, parts, and components including partially fabricated subassemblies.</p> <p>N18.7 - Measures shall be provided for the identification and control of materials, parts, and components including partially fabricated subassemblies.</p>	<p>Controls shall be established to assure that only correct and accepted items are used or installed.</p>	<p>Similar requirement.</p>
<p>N45.2 - When codes, standards, or specifications require traceability of materials, parts, or components to specific inspection or test records, the program shall be designed to provide such traceability.</p> <p>N18.7 - When codes, standards or specifications require traceability of materials, parts or components to specific inspection or test records, the program shall be designed to provide such traceability.</p>	<p>Identification shall be maintained on the items or in documents traceable to the items, or in a manner which assures that identification is established and maintained.</p>	<p>Similar requirement. The additional information in the Basic Requirement is similar to that contained later in the N45.2 and N18.7 text.</p>
	<p>SUPPLEMENT 8S-1 SUPPLEMENTARY REQUIREMENTS FOR IDENTIFICATION AND CONTROL OF ITEMS</p>	
	<p>1 GENERAL</p>	
	<p>This Supplement provides amplified requirements for identification and control of items.</p>	
	<p>It supplements the requirements of Basic Requirement 8 of this Part (Part 1) and shall be used in conjunction with that Basic Requirement when and to the extent specified by the organization invoking this Part (Part 1).</p>	
	<p>2 IDENTIFICATION METHODS</p>	
	<p>2.1 Item Identification</p>	
<p>N45.2 These measures shall provide for assuring that only correct and accepted items are used and installed, and relating an item of production (batch, lot, component, part) at any stage, from initial receipt through fabrication, installation, repair or modification, to an applicable drawing, specification, or other pertinent technical document.</p> <p>N18.7 - These procedures shall be implemented to provide insurance that only correct and accepted items are used and installed, and relating an item of production (batch, lot, component, part) at any stage, from initial receipt through fabrication, installation, repair or modification, to an applicable drawing, specification, or other pertinent</p>	<p>Items of production (batch, lot, component, part) shall be identified from the initial receipt and fabrication of the items up to and including installation and use. This identification shall relate an item to an applicable design or other pertinent specifying document.</p>	<p>Similar requirements.</p>

CRITERION 8 ANSI 45.2-1977, § 9 /N18.7-1976 § 5.2.13.3	BASIC REQUIREMENT 8 NQA-1994	COMMENTS
technical document.		
	2.2 Physical Identification	
N45.2.- Physical identification shall be used to the maximum extent possible. N18.7 - Physical identification shall be used to the maximum extent possible.	Physical identification shall be used to the maximum extent possible.	Same requirement.
N45.2 - Where physical identification is either impractical or insufficient, physical separation, procedural control, or other appropriate means shall be employed. N18.7 - Where physical identification is either impractical or insufficient, physical separation, procedural control or other appropriate means shall be employed.	Where physical identification on the item is either impractical or insufficient, physical separation, procedural control, or other appropriate means shall be employed.	Same requirement.
	2.3 Markings	
N45.2 - Identification may be either on the item or on records traceable to the item, as appropriate. Where identification marking is employed, the marking shall be clear, unambiguous, and indelible, and shall be applied in such a manner as not to affect the function of the item. N18.7 - Identification may be either on the item or on records traceable to the item, as appropriate. Where identification marking is employed, the marking shall be clear, unambiguous and indelible, and shall be applied in such a manner as not to affect the function of the item.	Identification markings, when used, shall be applied using materials and methods which provide a clear and legible identification and do not detrimentally affect the function or service life of the item.	Similar requirement, NQA-1 includes affect on service life of the component as well as function. (Note: Markings are covered in more detail in NQA-1, Subpart 2.2 that corresponds with ANSI N45.2.2. Addressed in a separate table.)
N45.2 - Markings shall be transferred to each part of an item when subdivided and shall not be obliterated or hidden by surface treatment or coatings unless other means of identification are substituted. N18.7 - Markings shall be transferred to each part of an item when subdivided and shall not be obliterated or hidden by surface treatment or coatings unless other means of identification are substituted.	Markings shall be transferred to each part of an identified item when subdivided and shall not be obliterated or hidden by surface treatment or coatings unless other means of identification are substituted.	Similar requirement.
	3 SPECIFIC REQUIREMENTS	
	3.1 Identification and Traceability of Items	
N45.2, ¶ 3 - When codes, standards, or specifications require traceability of materials, parts, or components to specific inspection or test records, the program shall be designed to provide such traceability. N18.7, ¶ 3 - When codes standards or specifications require	When specified by codes, standards, or specifications that include specific identification or traceability requirements (such as identification or traceability of the item to applicable specification and grade of material; heat, batch, lot, part, or serial number; or specified inspection, test, or	Similar requirement. NQA-1 provides examples “such as identification or traceability.... test, or other records.”

CRITERION 8 ANSI 45.2-1977, § 9 /N18.7-1976 § 5.2.13.3	BASIC REQUIREMENT 8 NQA-1994	COMMENTS
traceability of materials, parts or components to specific inspection or test records, the program shall be designed to provide such traceability.	other records), the program shall be designed to provide such identification and traceability control.	
	3.2 Limited Life Items	
	Where specified, items having limited calendar or operating life or cycles shall be identified and controlled to preclude use of items whose shelf life or operating life has expired.	New requirement. Already factored into Dominion's administrative controls.
	3.3 Maintaining Identification of Stored Items	
	Provisions shall be made for the control of item identification consistent with the planned duration and conditions of storage, such as: (a) provisions for maintenance or replacement of markings and identification records due to damage during handling or aging; (b) protection of identifications on items subject to excessive deterioration due to environmental exposure; (c) provisions for updating existing plant records.	Similar requirement to N45.2.2, § 6.4.1 in that an inspection would identify the need to correct these types of deficiencies.

CRITERION 9 ANSI 45.2 §10/ANSI N18.7 § 5.2.18	BASIC REQUIREMENT 9 NQA-1-1994	COMMENTS
		Overall notes: NQA-1 – 1983 and 1994 leave the word Special out of the title. The text does address special processes. The requirements of N45.2 and ANSI N18.7 are similar in nature to that expounded on in Supplement 9S-1. Therefore, the specific wording from these standards is not repeated over and over next to the similar statements of NQA-1.
<p>N45.2 Measures shall be established and documented to assure that special processes, ... are accomplished under controlled conditions in accordance with applicable codes, standards, specifications, criteria, and other special requirements, ...</p> <p>N18.7 5.2.18 Measures shall be established and documented to assure that special processes, accomplished under controlled conditions in accordance with applicable codes, standards, specifications, criteria, and other special requirements, ...</p>	Processes affecting quality of items or services shall be controlled.	Similar requirements for controlling processes, but NQA-1 doesn't limit the processes at this point to those that are deemed special processes.
<p>N45.2 Measures shall be established and documented to assure that special processes, including welding, heat treating, cleaning, and nondestructive examination, are accomplished under controlled conditions in accordance with applicable codes, standards, specifications, criteria, and other special requirements, using qualified personnel and procedures.</p> <p>N18.7 5.2.18 Special processes are those that require interim inprocess controls in addition to final inspection to assure quality including such processes as welding, heat treating, chemical cleaning, and nondestructive examination.</p>	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.	ANSI N18.7 defines special processes and includes chemical cleaning as a special process. (Will address within the text of the QAPD, Section 9)
	SUPPLEMENT 9S-1 SUPPLEMENTARY REQUIREMENTS FOR CONTROL OF PROCESSES	
	1 GENERAL	
	This Supplement provides amplified requirements for control of processes.	

CRITERION 9 ANSI 45.2 §10/ANSI N18.7 § 5.2.18	BASIC REQUIREMENT 9 NQA-1-1994	COMMENTS
	It supplements the requirements of Basic Requirement 9 of this Part (Part 1) and shall be used in conjunction with that Basic Requirement when and to the extent specified by the organization invoking this Part (Part 1).	
	2 PROCESS CONTROL	
<p>N45.2 Measures shall be established and documented to assure that special processes, ... are accomplished ... using qualified ... procedures.</p> <p>N18.7 5.2.18 Measures shall be established and documented to assure that special processes, ... use qualified ... procedures.</p>	Processes shall be controlled by instructions, procedures, drawings, checklists, travelers, or other appropriate means.	Similar requirements.
<p>N45.2 Measures shall be established and documented to assure that special processes, ... are accomplished under controlled conditions</p> <p>N18.7 5.2.18 Measures shall be established and documented to assure that special processes, accomplished under controlled conditions ... use qualified personnel and procedures.</p>	These means shall assure that process parameters are controlled and that specified environmental conditions are maintained.	Similar requirements.
	3 SPECIAL PROCESSES	
	Each special process shall be performed in accordance with appropriate instructions which include or reference procedure, personnel, and equipment qualification requirements.	Procedure adherence is addressed in Section 5 of the QAPD.
	3.1 Responsibility	
	It is the responsibility of the organization performing the special process to adhere to the approved procedures and processes.	Procedure adherence is currently addressed in the QA Standards related to Criterion 5. Similar requirements exist.
<p>N45.2 Qualification of personnel, procedures, and equipment shall comply with the requirements of applicable codes and standards.</p> <p>N18.7 5.2.18 Qualification of personnel, procedures, and equipment shall comply with the requirements of applicable codes and standards.</p>	3.1.1 Qualification of personnel, procedures, and equipment shall comply with specified requirements.	Similar requirements.

CRITERION 9 ANSI 45.2 §10/ANSI N18.7 § 5.2.18	BASIC REQUIREMENT 9 NQA-1-1994	COMMENTS
<p>N45.2 Measures shall be established and documented to assure that special processes, ... are accomplished under controlled conditions</p> <p>N18.7 5.2.18 Measures shall be established and documented to assure that special processes, accomplished under controlled conditions ...</p>	<p>3.1.2 Conditions necessary for accomplishment of the process shall be included in procedures or instructions. These conditions shall include proper equipment, controlled parameters of the process, and calibration requirements.</p>	<p>Similar requirements.</p>
	<p>3.2 Acceptance Criteria</p>	
	<p>The requirements of applicable codes and standards, including acceptance criteria for the process, shall be specified or referenced in the procedures or instructions.</p>	<p>Acceptance criteria currently addressed in the QA Standards related to Criterion 5. Similar requirements exist.</p>
	<p>3.3 Records</p>	
<p>N45.2 - Documentation shall be maintained for currently qualified personnel, processes, or equipment in accordance with the requirements of pertinent codes and standards.</p> <p>N18.7 - 5.2.12 requires provisions “be made for preparation and retention of plant records as appropriate.”</p>	<p>Records shall be maintained as appropriate for the currently qualified personnel, processes, and equipment of each special process</p>	<p>Similar requirements.</p>
	<p>3.4 Special Requirements</p>	
<p>N45.2 For special processes not covered by existing codes or standards, or where item quality requirements exceed the requirements of established codes or standards, the necessary qualifications of personnel, procedures, or equipment shall be defined.</p> <p>N18.7 For special processes not covered by existing codes or standards, or where item quality requirements exceed the requirements of established codes or standards, the necessary qualifications of personnel, procedures, or equipment shall be defined.</p>	<p>For special processes not covered by existing codes and standards or where quality requirements specified for an item exceed those of existing codes or standards, the necessary requirements for qualifications of personnel, procedures, or equipment shall be specified or referenced in the procedures or instructions.</p>	<p>Similar requirements.</p>

CRITERION 10 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 10 NQA-1 1994	COMMENTS
N45.2 § 11, N18.7 § 5.2.17		
<p>N45.2, ¶ 1 A program for inspection of activities affecting quality shall be established and executed by or for the organization performing the activity to verify conformance to the documented instructions, procedures, and drawings for accomplishing the activity.</p> <p>N45.2, ¶ 2 Examinations, measurements, or tests of items processed shall be performed for each work operation where necessary to assure quality.</p> <p>N18.7, ¶ 1 A program for inspection of activities affecting safety shall be established and executed by or for the organization performing the activity to verify conformance with applicable documented instructions, procedures, and drawings.</p> <p>¶ 2 Inspections, examinations, measurements, or tests of material, products, or activities shall be performed for each work operation where necessary to assure quality.</p>	<p>Inspections required to verify conformance of an item or activity to specified requirements shall be planned and executed.</p>	<p>Similar requirement.</p>
<p>N18.7, ¶ 4 Inspections of safety-related activities shall be performed in accordance with approved written procedures, which set forth the requirements and acceptance limits and specify the inspection responsibilities.</p>	<p>Characteristics to be inspected and inspection methods to be employed shall be specified.</p>	<p>Similar requirement.</p>
<p>N18.7, § 5.3.10, ¶ 1 Test and inspection results shall be documented ...</p>	<p>Inspection results shall be documented.</p>	<p>Similar requirement.</p>
<p>N45.2 ¶ 1 Inspection activities to verify the quality of work shall be performed by appropriately trained persons other than those who performed the activity being inspected.</p> <p>N18.7 ¶ 2 Such inspections shall be performed by qualified individuals other than those who performed or directly supervised the activity being inspected. These independent inspections, i.e., those performed by individuals not assigned first-line supervisory responsibility for the conduct of the work, are not intended to dilute or replace the clear responsibility of first-line supervisors for the quality of work performed under their supervision.</p>	<p>Inspection for acceptance shall be performed by persons other than those who performed or directly supervised the work being inspected.</p>	<p>Similar requirement. NQA-1 and N18.7 both specify that it should not be those who performed the activity or directly supervised the activity (work) being inspected. N45.2 addresses this below.</p>
<p>N18.7, ¶ 6 - The owner organization shall evaluate</p>		<p>Not specifically addressed by NQA-1.</p>

CRITERION 10 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 10 NQA-1 1994	COMMENTS
inspection results along with test results (see Section 5.2.19) to determine whether the individual inspection and test programs demonstrate that the plant can be operated safely and as designed.		Addressed within the QAPD as an inspection program function subject to audit.
	SUPPLEMENT 10S-1 SUPPLEMENTARY REQUIREMENTS FOR INSPECTION	
	1 GENERAL	
	This Supplement provides amplified requirements for inspection of items and activities.	
	It supplements the requirements of Basic Requirement 10 of this Part (Part I) and shall be used in conjunction with that Basic Requirement when and to the extent specified by the organization invoking this Part (Part I).	
	2 INSPECTION REQUIREMENTS	
N18.7, ¶ 4 Information concerning inspection shall be obtained from the related design drawings, specifications and/or other controlled documents.	Inspection requirements and acceptance criteria shall include specified requirements contained in the applicable design documents or other pertinent technical documents approved by the responsible design organization.	Similar requirement.
N18.7, ¶ 4 Inspections of safety-related activities shall be performed in accordance with approved written procedures, ... N18.7, § 5.3.10, ¶ 1 Test and inspection results shall be documented ...	Inspection activities shall be documented and controlled by instructions, procedures, drawings, checklists, travelers, or other appropriate means.	Similar requirement. NQA-1 allows use of documents other than procedures to control the inspection.
	3 PERSONNEL	
	3.1 Reporting Independence	
N45.2, ¶ 1 - Such persons shall not report directly to the immediate supervisors who are responsible for the work being inspected. N18.7, ¶ 2 - Inspection of operating activities (work functions associated with normal operation of the plant, routine maintenance, and certain technical services routinely assigned to the onsite operating organization) may be conducted by second-line supervisory personnel or by other qualified personnel not assigned first-line supervisory responsibility for conduct of the work.	Inspection personnel shall not report directly to the immediate supervisors who are responsible for performing the work being inspected.	Similar requirement, but NQA-1 adds a requirement for inspectors to not report to the immediate supervisor for the work. (consistent with N45.2) Current VA practice is to allow persons to perform inspections who were not performing the work, but who report directly to the immediate supervisor responsible for the work with a provision that, during the inspection period, they are reporting through the organization responsible for the inspection program. The

CRITERION 10 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 10 NQA-1 1994	COMMENTS
		QAPD, Appendix C, contains the following clarification: "Where quality verification inspections at operating facilities are performed by the Maintenance group, to meet the independence requirements of NQA-1, Supplement 10S-1, Section 3.1, the inspectors report to the Facility Safety and Licensing organization while performing the inspection."
	3.2 Qualification	
N45.2, ¶ 1 Inspection activities to verify the quality of work shall be performed by appropriately trained persons.... N18.7, ¶ 4 - When inspection techniques require specialized qualifications or skills, personnel performing the inspection shall meet applicable licensing requirements, codes, and standards appropriate to the discipline involved (see also Sections 5.2.7, 5.2.6 and 5.3.10).	Each person who verifies conformance of work activities for purposes of acceptance shall be qualified to perform the assigned inspection task.	Similar requirement.
	Inspections by persons during on-the-job training for qualification shall be performed under the direct observation and supervision of a qualified person and verification of conformance shall be by the qualified person until certification is achieved.	New requirement to this standard, but consistent with those of the standards for training and qualification.
	4 INSPECTION HOLD POINTS	
N45.2, ¶ 4 - If mandatory inspection hold points, which require witnessing or inspecting by the purchaser's designated representative and beyond which work shall not proceed without the consent of the purchaser's designated representative, are required, the specific hold points shall be indicated in appropriate documents. N18.7, ¶ 4 - If mandatory inspection hold points are required, the specific hold points shall be indicated in appropriate documents.	If mandatory inspection hold points are required beyond which work shall not proceed without the specific consent of the designated representative, the specific hold points shall be indicated in appropriate documents.	Similar requirement.
N45.2, ¶ 4 - Such consent shall be documented prior to the continuation of work beyond the designated hold point.	Consent to waive specified hold points shall be recorded prior to continuation of work beyond the designated hold point.	Similar requirement.

CRITERION 10 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 10 NQA-1 1994	COMMENTS
	5 INSPECTION PLANNING	
	5.1 Planning	
	Planning for inspection activities shall be accomplished and documented. The documentation shall identify characteristics, methods, and acceptance criteria, and shall provide for recording objective evidence of inspection results.	New requirement. This currently is met through the development of inspection documents.
	5.2 Sampling	
N45.2, ¶ 2 - Where a sample is used to verify acceptability of a group of items, the sampling procedure shall be based on recognized standard practices and shall provide adequate justification for the sample size and selection process.	Where a sample is used to verify acceptability of a group of items, the sampling procedure shall be based on recognized standard practices.	Similar requirement.
	6 IN-PROCESS INSPECTION	
	6.1 Inspection	
	Inspection of items in-process or under construction shall be performed for work activities where necessary to verify quality.	New requirement addressing items in-process or under construction. This is consistent with current practice.
N45.2, ¶ 3 -If inspection of processed items is impossible or disadvantageous, indirect control by monitoring of processing methods, equipment, and personnel shall be provided. N18.7, ¶ 5 - If inspection is impossible or disadvantageous, indirect control by monitoring processing methods, equipment and personnel shall be provided.	If inspection of processed items is impossible or disadvantageous, indirect control by monitoring of processing methods, equipment, and personnel shall be provided.	Similar requirement.
N45.2, ¶ 3 - Both inspection and process monitoring shall be provided when control is inadequate without both. N18.7 ¶ 5 - Both inspection and process monitoring shall be provided when control is inadequate without both..	Both inspection and process monitoring shall be provided when control is inadequate without both.	Similar requirement.
	6.2 Combined Inspection and Monitoring	
N18.7 ¶ 5 - In cases where documented verification of quality implied by the above requirements is not possible or feasible, the extent of inspection or performance testing to verify adequacy of structures, systems, or components for service should be, in general, greater than otherwise required.	6.2.1 A combination of inspection and process monitoring methods, when used, shall be performed in a systematic manner to assure that the specified requirements for control of the process and quality of the item are being achieved throughout the duration of the process.	NQA-1 meets the intent of N18.7. NQA-1 is more descriptive of how to combine inspection and monitoring that is not addressed in N45.2 or specifically addressed in N18.7.
	6.2.2 Controls, where required, shall be established and documented for the coordination and sequencing of these	

CRITERION 10 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 10 NQA-1 1994	COMMENTS
	activities at established inspection points during successive stages of the conducted process or construction.	
	7 FINAL INSPECTIONS	Requirements carried forward from the N45.2.4 and N45.2.8 standards on Electrical/I&C and Mechanical Installations. These are also addressed in comparing NQA-1, Subparts 2.4 and 2.8 to the N45.2 series standards.
	7.1 Resolution of Nonconformances	
	Final inspections shall include a records review of the results and resolution of nonconformances identified by prior inspections.	
	The final inspection shall be planned to arrive at a conclusion regarding conformance of the item to specified requirements.	
	7.2 Inspection Requirements	
	Completed items shall be inspected for completeness, markings, calibration, adjustments, protection from damage, or other characteristics as required to verify the quality and conformances of the item to specified requirements.	
	Quality records shall be examined for adequacy and completeness if not previously so examined.	
	7.3 Acceptance	
	The acceptance of the item shall be documented and approved by authorized personnel.	
	7.4 Modifications, Repairs, or Replacements	
N18.7, ¶ 3 - For modifications and nonroutine maintenance, inspections shall be conducted in a manner similar (frequency, type, and personnel performing such inspections) to that associated with construction phase activities (see also Section 5.2.7).	Modifications, repairs, or replacements of items performed subsequent to final inspection shall require reinspection or retest, as appropriate, to verify acceptability.	Similar requirement. NQA-1 uses the term “reinspection or retest, as appropriate,” in lieu of “in a manner similar to ... construction phase activities.” NQA-1 also applies to construction.
	8 INSERVICE INSPECTION	
	8.1 Planning and Performance	
N45.2, ¶ 5 - A program for required inservice inspection of completed systems, structures, and components shall be planned and executed by or for the organization responsible for operation of the nuclear facility. N18.7, § 5.2.8, ¶ 1 Provisions shall be made for performing required surveillance testing and inspections, including inservice inspections. Additional control	Required in-service inspection or surveillance of structures, systems, or components shall be planned and executed by or for the organization responsible for operation.	Similar requirement.

CRITERION 10 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 10 NQA-1 1994	COMMENTS
procedures shall be instituted, as necessary, to assure timely conduct of surveillance tests and inspections and appropriate documentation, reporting, and evaluation of the results.		
	8.2 Methods	
	Inspection methods shall be established and executed to verify that the characteristics of an item continue to remain within specified limits. Inspection methods shall include evaluations of performance capability of essential emergency and safety systems and equipment, verification of calibration and integrity of instruments and instrument systems, and verification of maintenance, as appropriate.	NQA-1 addresses requirements of the inservice inspection/testing program that were not addressed in the previous Quality Standards. Not a new requirement above the existing ASME inservice inspection requirements.
	9 RECORDS	
N18.7, ¶ 6 - Records shall be kept in sufficient detail to permit adequate confirmation of the inspection program. The person recording the data as well as the person approving the inspection results shall be identified. Deviations, their cause, and any corrective action completed or planned as a result of the deviations shall be documented. Inspection records shall be identified as such and shall be retrievable (see also Section 5.2.12).	Records shall, as a minimum, identify (a) through below: (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 requirement. Requirement to identify the person recording data is eliminated. Requirement for inspection records to be specifically identified as such is not included in NQA-1. This allows for inspections being documented within maintenance and test procedures.

CRITERION 11 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 11 NQA-1 1994	COMMENTS
N45.2 §12 / N18.7 § 5.2.19	BASIC REQUIREMENT	
<p>N45.2, ¶ 1 A test program shall be established to assure that all testing required to demonstrate that the item will perform satisfactorily in service is identified and documented, ...</p> <p>N18.7, ¶ 1 A test program shall be established to assure that testing required to demonstrate that the item will perform satisfactorily in service is identified and documented, ...</p> <p>N18.7, § 5.2.19.2 Tests Prior to and During Initial Plant Operation.</p> <p>¶ 1 Prior to placing a nuclear power plant into operation, a preoperational test program shall be performed to demonstrate the functional adequacy of plant components, systems and structures. Following fuel loading an initial start-up test program shall be conducted to evaluate plant performance as the start-up progresses.</p> <p>¶ 2 Responsibilities The ultimate responsibility for the preparation and execution of adequate preoperational and initial start-up test programs rests with the owner organization. If design or construction is performed by other than the owner organization, design organizations involved should participate in definition of the programs, and the construction organization involved may supply manpower or supervision for execution of part or all of the program, but the owner organization shall determine that the program is adequate and that the results are satisfactory.</p> <p>¶ 3 Scheduling A schedule shall be provided and maintained to provide assurance that all necessary tests are performed and properly evaluated on a timely basis. Testing shall be scheduled so that the safety of the plant is never dependent on the performance of an untested system (see also Section 5.2.8).</p>	<p>Tests required to verify conformance of an item or computer program to specified requirements and to demonstrate satisfactory performance for service shall be planned and executed.</p>	<p>NQA-1 adds requirement for test of computer software.</p> <p>N18.7 provides more specifics on “demonstrating satisfactory performance for service” at the point where initial operation of a plant is beginning and will be addressed in the QAPD. The organization section of the new QAPD addresses the responsibilities from N18.7.</p>
<p>N45.2, ¶ 1 ... and that the testing is performed in accordance with written test procedures which incorporate or reference the requirements and acceptance limits contained in applicable design documents</p>	<p>Characteristics to be tested and test methods to be employed shall be specified.</p>	<p>Similar Requirement.</p>

CRITERION 11 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 11 NQA-1 1994	COMMENTS
<p>N18.7, ¶ 1 ... and that the testing is performed in accordance with written test procedures which incorporate or reference the requirements and acceptance limits contained in applicable design documents.</p>		
<p>N45.2, ¶ 2 Test results shall be documented and evaluated by responsible authority to assure that test requirements have been satisfied.</p> <p>N18.7, § 5.3.10, ¶ 1 Test and inspection results shall be documented and evaluated by responsible authority to assure that test and inspection requirements have been satisfied.</p> <p>N18.7, § 5.2.17, ¶ 6 The owner organization shall evaluate inspection results along with test results (see Section 5.2.19) to determine whether the individual inspection and test programs demonstrate that the plant can be operated safely and as designed.</p> <p>N18.7, § 5.2.8, ¶ 1 Provisions shall be made for performing required surveillance testing and inspections, including inservice inspections. ... Additional control procedures shall be instituted, as necessary, to assure timely conduct of surveillance tests and inspections and appropriate documentation, reporting, and evaluation of the results.</p>	<p>Test results shall be documented and their conformance with acceptance criteria shall be evaluated.</p>	<p>Similar Requirement.</p>
	<p>Tests required to collect data, such as for siting or design input, shall be planned, executed, documented, and evaluated.</p>	<p>NQA-1 adds requirement for siting and design input to address new construction and design changes.</p>
	<p>SUPPLEMENT 11S-1 SUPPLEMENTARY REQUIREMENTS FOR TEST CONTROL</p>	
	<p>1 GENERAL</p>	
	<p>This Supplement provides amplified requirements for test control.</p>	
	<p>It supplements the requirements of Basic Requirement 11 of this Part (Part 1) and shall be used in conjunction with that Basic Requirement when and to the extent specified by the organization invoking this Part (Part 1).</p>	
	<p>2 TEST REQUIREMENTS</p>	
<p>N45.2, ¶ 1 Test requirements and acceptance criteria shall be provided by the organization responsible for the design</p>	<p>Test requirements and acceptance criteria shall be provided or approved by the organization responsible for the design</p>	<p>Similar Requirement.</p>

CRITERION 11 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 11 NQA-1 1994	COMMENTS
of the item under test, unless otherwise designated.	of the item to be tested unless otherwise designated.	
<p>N45.2, ¶ 1 The test program shall cover all required tests, including, as appropriate, prototype qualification tests, proof tests prior to installation, preoperational tests, and operational tests to verify continued satisfactory performance during operation.</p> <p>N18.7, ¶ 1-5 The test program shall cover all required tests including:</p> <p>(1) Tests during the preoperational period to demonstrate that performance of plant systems is in accordance with design intent and that the coordinated operation of the plant as a whole is satisfactory, to the extent feasible.</p> <p>(2) Tests during the initial operational phase to demonstrate the performance of systems that could not be tested prior to operation and to confirm those physical parameters, hydraulic or mechanical characteristics that need to be known, but which could not be predicted with the required accuracy, and to confirm that plant behavior conforms to design criteria. The initial start-up test program shall be planned to permit safe fuel loading and start-up; to increase power in safe increments; and to perform major testing at specified power plateaus. If tests require the variation of operating parameters outside of their normal range, the limits within which such variation is permitted shall be prescribed. Prerequisites and record keeping shall be given attention and the scope of the testing shall demonstrate insofar as practicable that the plant is capable of withstanding the design transients and accidents. The suitability of plant operating procedures should be checked to the maximum extent possible during the preoperational and initial start-up test programs.</p> <p>(3) Surveillance tests during the operational phase to provide assurance that failures or substandard performance do not remain undetected and that the required reliability of safety-related systems is maintained (see Section 5.2.8).</p> <p>(4) Tests during design, fabrication and construction activities associated with plant maintenance and modifications during the operational phase and the demonstration of satisfactory performance following plant</p>	Required tests, including, as appropriate, prototype qualification tests, production tests, proof tests prior to installation, construction tests, pre-operational tests, and operational tests shall be controlled.	<p>NQA-1 includes production tests that are not addressed by ANSI N45.2 or N18.7.</p> <p>ANSI N18.7 gives more detail on the purpose and extent of the described tests. This is addressed in the QAPD, Section 11.1.</p>

CRITERION 11 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 11 NQA-1 1994	COMMENTS
<p>maintenance and modifications or procedural changes (see Section 5.2.7).</p> <p>NRC Reg. Guide 1.33, Regulatory Position C.5.f – The guidelines (indicated by the verb “should”) of ANSI N18.7-1976/ANS-3.2 contained in the following sections have sufficient safety importance to be treated the same as the requirements (indicated by the verb “shall”) of the standard: f. Section 5.2.19(2) – The guideline for checking plant operating procedures during the testing program.</p> <p>Alternative from current VA QA Topical Report - (6) Paragraph C.5.f of Regulatory Guide 1.33 (and Section 5.2.19.(2) of ANSI N18.7 which it references) will be implemented when determined by station management.</p> <p>N18.7, § 5.2.19.3 Tests Associated with Plant Maintenance, Modifications or Procedure Changes. Tests shall be performed following plant modifications or significant change in operating procedures to confirm that the modifications or changes reasonably produce expected results and that the change does not reduce safety of operations.</p>		
<p>N45.2, ¶ 1 ... and that the testing is performed in accordance with written test procedures which incorporate or reference the requirements and acceptance limits contained in applicable design documents</p> <p>N18.7, ¶ 1 ... and that the testing is performed in accordance with written test procedures which incorporate or reference the requirements and acceptance limits contained in applicable design documents.</p>	<p>Test requirements and acceptance criteria shall be based upon specified requirements contained in applicable design or other pertinent technical documents.</p>	<p>NQA-1 addresses other pertinent documents other than design documents that may be a source of technical requirements or acceptance limits.</p>
	<p>3 TEST PROCEDURES</p>	
<p>N45.2, ¶ 2 Test procedures shall include provisions for assuring that prerequisites for the given test have been met, that adequate instrumentation is available and used, and that necessary monitoring is performed.</p> <p>N18.7, § 5.3.10, ¶ 1 Test and inspection procedures shall contain a description of objectives; acceptance criteria that will be used to evaluate the results; prerequisites for performing the tests or inspections including any special conditions to be used to simulate normal or abnormal</p>	<p>Tests procedures shall include or reference test objectives and provisions for assuring that prerequisites for the given test have been met, that adequate instrumentation is available and used, that necessary monitoring is performed, and that suitable environmental conditions are maintained.</p>	<p>Similar requirement. ANSI N18.7 contains more detail on the objectives of preoperational and operational tests. This is addressed in the QAPD (sections 5 & 11).</p>

<p align="center">CRITERION 11 ANSI N45.2-77/ANSI N18.7-76</p>	<p align="center">BASIC REQUIREMENT 11 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>operating conditions; limiting conditions; and the test or inspection procedure. These procedures shall also specify any special equipment or calibrations required to conduct the test or inspection.</p> <p>ANSI N18.7, § 5.3.10, ¶ 2 Where tests and inspections are to be witnessed, the procedure shall identify hold points in the testing sequence to permit witnessing. The procedure shall require appropriate approval for the work to continue beyond the designated hold point.</p> <p>N18.7, § 5.2.19.1 Preoperational Tests</p> <p>¶ 1 Preoperational tests are generally performed sequentially in accordance with written procedures.</p> <p>¶ 4 A component test is a functional, operational or performance test of an individual piece of equipment or unit system under prescribed conditions. Typical parameters to be examined are direction of rotation, bearing temperatures, vibration, time delays, and ability to operate with remote and local controls. The procedure should list checks to be made and provide acceptance criteria. Consideration should also be given to providing a run-in period to minimize early failures during operation of the plant.</p> <p>¶ 5 Individual system tests establish the functional adequacy by operation under prescribed conditions. The tests shall be designed to permit evaluation of system performance including, for example, the measurement of flow, temperature, pressure, response time and vibration, transfer of power supply to emergency power and accuracy and response of control devices.</p> <p>¶ 6 The preoperational testing program should demonstrate, as nearly as can be practicably simulated, the overall integrated operation of the plant systems at rated conditions, including simultaneous operations of auxiliary systems. It may be necessary to defer portions of these tests until nuclear heat is available. The procedures used should be similar to those discussed in 5.3.3 and 5.3.4, and they should be modified to require variation in control parameters, such as pump stops and restarts, cycling valves and varying flows so that system performance can be</p>		

CRITERION 11 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 11 NQA-1 1994	COMMENTS
<p>evaluated. For additional requirements in matters relating to preoperational test programs, American National Standard N45.2.8-1975 is generally applicable. [8]</p> <p>NRC Reg. Guide 1.33, Regulatory Position C.5.g – The guidelines (indicated by the verb “should”) of ANSI N18.7-1976/ANS-3.2 contained in the following sections have sufficient safety importance to be treated the same as the requirements (indicated by the verb “shall”) of the standard: g. Section 5.2.19.1 – The guideline for preoperational tests, except the guideline that refers to a run-in period for equipment. In addition to these guidelines, the prerequisite steps for each equipment test should be completed prior to the commencement of the preoperational test.</p> <p>Alternative from current VA QA Topical Report - (7) Paragraph C.5.g of Regulatory Guide 1.33 (and Section 5.2.19.1 of ANSI N18.7 which it references) will be implemented with the addition of the modifier “normally” after each of the verbs (should) which the Regulatory Guide converts to “shall.” It is the Company’s intent to fully comply with the requirements of this paragraph, and any conditions which do not fully comply will be documented and approved by station management personnel. In these areas, the reason for the exception shall also be documented. The documentation shall be retained for the same period of time as the affected preoperational test.</p>		
<p>N45.2, ¶ 2 Prerequisites include such items as calibrated instrumentation, appropriate equipment, trained personnel, condition of test equipment and the item to be tested, suitable environmental conditions, and provisions for data acquisition.</p> <p>N18.7, § 5.3.10, ¶ 1 Test and inspection procedures shall contain a description of objectives; acceptance criteria that will be used to evaluate the results; prerequisites for performing the tests or inspections including any special conditions to be used to simulate normal or abnormal operating conditions; limiting conditions; and the test or inspection procedure. These procedures shall also specify</p>	<p>Prerequisites shall include the following, as applicable: calibrated instrumentation, appropriate equipment, trained personnel, condition of test equipment and the item to be tested, suitable environmental conditions, and provisions for data acquisition.</p>	<p>Basic requirements are similar. ANSI N18.7 provides more detail on the nature and content of prerequisites. This is addressed in the QAPD.</p>

CRITERION 11 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 11 NQA-1 1994	COMMENTS
<p>any special equipment or calibrations required to conduct the test or inspection.</p> <p>N18.7, § 5.2.19.1 Preoperational Tests</p> <p>¶ 2 Procedures should ensure that prerequisite steps for equipment testing, such as completion of necessary construction, prior testing, safety precautions, and measures to preserve equipment status have been or will be performed (see also Sections 5.2.17 and 5.3.10).</p> <p>¶ 3 A detailed prescribed physical inspection of equipment components and facilities should be performed to ensure readiness for operation. Typical items to be covered include cleanliness, lubrication, setting of limit switches, calibration of instruments and presence of safety devices. The test procedure should list the checks to be made and include acceptance criteria and reference sources, such as vendor's literature, engineering drawings or plant specifications.</p> <p>NRC Reg. Guide 1.33, Regulatory Position C.5.g – The guidelines (indicated by the verb “should”) of ANSI N18.7-1976/ANS-3.2 contained in the following sections have sufficient safety importance to be treated the same as the requirements (indicated by the verb “shall”) of the standard: g. Section 5.2.19.1 – The guideline for preoperational tests, except the guideline that refers to a run-in period for equipment. In addition to these guidelines, the prerequisite steps for each equipment test should be completed prior to the commencement of the preoperational test.</p> <p>Alternative from current VA QA Topical Report - (7) Paragraph C.5.g of Regulatory Guide 1.33 (and Section 5.2.19.1 of ANSI N18.7 which it references) will be implemented with the addition of the modifier “normally” after each of the verbs (should) which the Regulatory Guide converts to “shall.” It is the Company’s intent to fully comply with the requirements of this paragraph, and any conditions which do not fully comply will be documented and approved by station management personnel. In these areas, the reason for the exception shall also be documented. The documentation shall be retained</p>		

CRITERION 11 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 11 NQA-1 1994	COMMENTS
for the same period of time as the affected preoperational test.		
	In lieu of specially prepared written test procedures, appropriate sections of related documents, such as ASTM methods, Supplier manuals, equipment maintenance instructions, or approved drawings or travelers with acceptance criteria, can be used. Such documents shall include adequate instructions to assure the required quality of work.	NQA-1 addresses using standard test methods or other forms of instructions.
	4 TEST RESULTS	
N45.2, ¶ 2 Test results shall be documented and evaluated by responsible authority to assure that test requirements have been satisfied. N18.7, § 5.3.10, ¶ 1 Test and inspection results shall be documented and evaluated by responsible authority to assure that test and inspection requirements have been satisfied.	Test results shall be documented and evaluated by a responsible authority to assure that test requirements have been satisfied.	Similar requirement.
	5 TEST RECORDS	
ANSI N18.7, § 5.3.10, ¶ 2 The test and inspection procedures shall require recording the date, identification of those performing the test or inspection, as found condition, corrective actions performed, if any, and as-left condition.	Test records shall, as a minimum, identify (a) through (g) below: (a) item tested (b) date of test (c) tester or data recorder (d) type of observation (e) results and acceptability (f) action taken in connection with any deviations noted (g) person evaluating test results	Similar requirement.
	SUPPLEMENT 11S—2 SUPPLEMENTARY REQUIREMENTS FOR COMPUTER PROGRAM TESTING	NQA-1-1994 adds requirements in this Supplement for QA for Computers and Software. Additional requirements are contained in Basic Requirement 3 with Supplement 3S-1 and Subpart 2.7 of NQA-1. These quality assurance requirements were not specifically addressed in the previous standards. However, the NRC required licensees to commit to controlling computer software in their QA Programs.

CRITERION 11 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 11 NQA-1 1994	COMMENTS
	1 GENERAL	
	This Supplement provides amplified requirements for testing of computer programs and associated computer systems.	
	It supplements the requirements of Basic Requirement 11 of this Part (Part 1) and shall be used in conjunction with that Basic Requirement when and to the extent specified by the organization invoking this Part (Part 1).	
	2 TEST REQUIREMENTS	
	Test requirements and acceptance criteria shall be provided or approved by the organization responsible for the design of the item to be tested unless otherwise designated.	
	Required tests including (as appropriate) verification tests, hardware integration tests, and in-use tests shall be controlled.	
	Test requirements and acceptance criteria shall be based upon applicable design or other pertinent technical documents.	
	2.1 Verification Tests	
	Verification tests shall demonstrate the capability of the computer program to produce valid results for test problems encompassing the range of permitted usage defined by the program documentation.	
	Acceptable test problem solutions are as follows:	
	(a) hand calculations;	
	(b) calculations using comparable proven programs; or	
	I empirical data and information from technical literature.	
	For programs used for operational control, testing shall demonstrate required performance over the range of operation of the controlled function or process.	
	Depending on the complexity of the computer program being tested, testing may range from a single test of the completed computer program to a series of tests performed at various stages of computer program development to verify correct translation between stages and proper working of individual modules, followed by an overall computer program test.	
	Regardless of the number of stages of testing performed,	

CRITERION 11 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 11 NQA-1 1994	COMMENTS
	verification testing shall be sufficient to establish that test requirements are satisfied and that the computer program produces a valid result for its intended function.	
	2.2 In-Use Tests	
	Test problems shall be developed and documented to permit confirmation of acceptable performance of the computer program in the operating system.	
	Test problems shall be run whenever the computer program is installed on a different computer, or when significant hardware or operating system configuration changes are made.	
	Periodic in-use manual or automatic self-check routines shall be prescribed and performed for those applications where computer failures or drift can affect required performance.	
	3 TEST PROCEDURES	
	Test procedures or plans shall specify the following, as applicable: (a) required tests and test sequence (b) required ranges of input parameters (c) identification of the stages at which testing is required (d) criteria for establishing test cases (e) requirements for testing logic branches (f) requirements for hardware integration (g) anticipated output values (h) acceptance criteria (i) reports, records, standard formatting, and conventions.	
	4 TEST RESULTS	
	Test results shall be documented.	
	Verification test results shall be evaluated by a responsible authority to assure that test requirements have been satisfied.	
	5 TEST RECORDS	
	(a) Verification test records shall identify (1) through (10) below. (1) computer program tested (2) computer hardware used (3) test equipment and calibrations, where applicable	

CRITERION 11 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 11 NQA-1 1994	COMMENTS
	(4) date of test (5) tester or data recorder (6) simulation models used, where applicable (7) test problems (8) results and acceptability (9) action taken in connection with any deviations noted (10) person evaluating test results.	
	(b) in-use test results shall identify (1) through (6) below: (1) computer program tested (2) computer hardware used (3) test equipment and calibrations, where applicable (4) date of test (5) tester or data recorder (6) acceptability.	

<p align="center">CRITERION 12 ANSI N45.2-77/ANSI N18.7-76</p>	<p align="center">BASIC REQUIREMENT 12 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>N45.2 §13 / N18.7 § 5.2.16</p>		
<p>N18.7 ¶ 2 Tools, instruments, testing equipment and measuring devices used for measurements, tests and calibration ... shall be controlled, calibrated and adjusted and maintained at specified intervals or prior to use to assure the necessary accuracy of calibrated devices.</p>	<p>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.</p>	<p>Similar requirement.</p>
	<p>SUPPLEMENT 12S-1 SUPPLEMENTARY REQUIREMENTS FOR CONTROL OF MEASURING AND TEST EQUIPMENT</p>	<p>Additional M&TE requirements are contained in NQA-1, Subpart 2.16, a standard not previously committed to at any of the current facilities.</p>
	<p>1 GENERAL</p>	
	<p>This Supplement provides amplified requirements for control of measuring and test equipment.</p>	
<p>N18.7 ¶ 1 The method and interval of calibration for each installed instrument and control device shall be defined and shall be based on the type of equipment, stability and reliability characteristics, required accuracies and other conditions affecting calibration. N18.7 ¶ 4 Special calibration shall be performed when the accuracy of ... installed ... equipment is questionable. N18.7 ¶ 4 American National Standard N45.2.4-1972 shall be applied to those activities occurring during the operational phase that are comparable in nature and extent to related activities occurring during construction.</p>	<p>It supplements the requirements of Basic Requirement 12 of this Part (Part 1) and shall be used in conjunction with that Basic Requirement when and to the extent specified by the organization invoking this Part (Part 1).</p>	<p>NQA-1 applicability is discussed in the Introductions to Parts I and II. It likewise applies to the operations phase. However, NQA-1 doesn't specifically state that the M&TE program is applicable to installed instrument and control devices. Installed instrument and control devices are calibrated and adjusted in accordance with the maintenance and testing programs and the controls are addressed in the new QAPD.</p>
	<p>2 SELECTION</p>	
<p>N45.2 ¶ 1 Measures shall be established and documented to assure that tools, gages, instruments, and other inspection, measuring, and testing equipment and devices used in activities affecting quality are of the proper range, type, and accuracy to verify conformance to established requirements. N18.7 ¶ 2 Tools, instruments, testing equipment and measuring devices used for measurements, tests and calibration shall be of the proper range and type and shall be controlled, calibrated and adjusted and maintained at specified intervals or prior to use to assure the necessary accuracy of calibrated devices. ANSI N45.2.1 § 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 tolerance to determine conformance to specified requirements. N45.2.2 § 2.5 Measuring and Test Equipment. 2.5.1 Selection. Inspection, examination, and testing equipment</p>	<p>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.</p>	<p>ANSI N45.2.5 contains additional information on the selection of M&TE along with a Virginia alternative to the QA requirements. This is addressed in NQA-1 Subpart 2.5. Based on discussion with VA NSS civil folks and NO personnel knowledgeable in concrete QA requirements, this alternative is no longer needed. Dominion has been calibrating this type of equipment and currently requires the supplier of these services to have this equipment in their calibration program.</p>

<p align="center">CRITERION 12 ANSI N45.2-77/ANSI N18.7-76</p>	<p align="center">BASIC REQUIREMENT 12 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>utilized to implement the requirements of this standard shall be selected to have accuracy and tolerance sufficient to determine conformance to specified requirements.</p> <p>N45.2.4 § 2.5 Measuring and Test Equipment 2.5.1 Selection Inspection and testing equipment with acceptable accuracy for performing the required function shall be selected. When general voltage levels, flow directions, or other parameters are checked, an instrument without high precision may be used. 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. Use shall be made of approved industry standards relating to measuring procedures. 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.</p> <p>N45.2.5 § 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 to be limited to thermometers, balances, scales, air entrainment meters, humidity meters, volumetric buckets, field soil density measuring devices, pressure gages, and torque wrenches.</p> <p>Clarification from the current VA QATR: (1) With regard to Section 2.5.1 of ANSI N45.2.5-1974, titled Selection: The Company complies with the requirement set forth in the first paragraph of this Section for selection of measuring and test equipment on the basis of sufficient accuracy to determine conformance to the standard’s requirements: This is accomplished without the use of calibrated balances or volumetric buckets. Clarification meets or exceeds applicable guides and standards. The proposed clarification is used to translate construction oriented documents to operational regulations.</p> <p>N45.2.8 § 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,</p>		

<p align="center">CRITERION 12 ANSI N45.2-77/ANSI N18.7-76</p>	<p align="center">BASIC REQUIREMENT 12 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>type and accuracy sufficient to determine conformance to specified requirements.</p> <p>N45.2.13 § 7.4 Measuring and Test Equipment 7.4.1 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.</p>		
	<p align="center">3 CALIBRATION AND CONTROL</p>	
	<p>3.1 Calibration</p>	
<p>N45.2 ¶ 1 To assure accuracy, inspection, measuring, and test equipment shall be controlled, calibrated, adjusted, and maintained at prescribed intervals or prior to use against certified equipment having known valid relationships to nationally recognized standards.</p> <p>N18.7 ¶ 2 Tools, instruments, testing equipment and measuring devices used for measurements, tests and calibration shall be of the proper range and type and shall be controlled, calibrated and adjusted and maintained at specified intervals or prior to use to assure the necessary accuracy of calibrated devices.</p> <p>ANSI N45.2.1 § 2.5 Test Equipment 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.</p> <p>N45.2.2 § 2.5 Measuring and Test Equipment. 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.</p> <p>N45.2.4 § 2.5 Measuring and Test Equipment 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. If no national standards exists, the basis for calibration shall be documented. Records of the calibrations shall be maintained and equipment suitably marked to indicate date of next required calibration. 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. Test equipment found to be out of calibration shall be clearly identified as such.</p>	<p>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.</p>	<p>Similar requirements.</p>

<p align="center">CRITERION 12 ANSI N45.2-77/ANSI N18.7-76</p>	<p align="center">BASIC REQUIREMENT 12 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>N45.2.5 § 2.5 Measuring and Test Equipment. 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 exists.</p> <p>N45.2.8 § 2.8 Measuring and Test Equipment 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.</p> <p>N45.2.13 § 7.4 Measuring and Test Equipment 7.4.2 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.</p>		
<p>N45.2 ¶ 1 If no national standards exist, the basis for calibration shall be documented.</p> <p>ANSI N45.2.1 § 2.5 Test Equipment 2.5.2 Calibration and Control. If no national standards exist, the basis of calibration shall be documented.</p> <p>N45.2.2 § 2.5 Measuring and Test Equipment. 2.5.2 Calibration and Control. If no national standards exists, the basis for calibration shall be documented.</p> <p>N45.2.4 § 2.5 Measuring and Test Equipment 2.5.2 Calibration and Control. If no national standards exists, the basis for calibration shall be documented.</p> <p>N45.2.5 § 2.5 Measuring and Test Equipment. 2.5.2 Calibration and Control. If no national standards exists, the basis for the adjustment or calibration shall be documented. Records shall be maintained and equipment suitably marked to indicate calibration status. Measures shall be taken to assure proper handling, storage and care of installation of inspection and testing equipment after calibration in order to maintain the required accuracy of such equipment.</p> <p>N45.2.8 § 2.8 Measuring and Test Equipment 2.8.2 If no national standards exist, the basis for calibration shall be documented.</p> <p>N45.2.13 § 7.4 Measuring and Test Equipment 7.4.2 Calibration and Control. If no standards exist, the basis for calibration shall be documented.</p>	<p>If no nationally recognized standards exist, the bases for calibration shall be documented.</p>	<p>Similar requirement.</p>

<p align="center">CRITERION 12 ANSI N45.2-77/ANSI N18.7-76</p>	<p align="center">BASIC REQUIREMENT 12 NQA-1 1994</p>	<p align="center">COMMENTS</p>
	<p>3.2 Control</p>	
<p>N45.2 ¶ 2 The method and interval of calibration for each item shall be defined and shall be based on the type of equipment, stability characteristics, required accuracy, and other conditions affecting measurement control.</p>	<p>The method and interval of calibration for each item shall be defined, based on the type of equipment stability characteristics, required accuracy, intended use, and other conditions affecting measurement control.</p>	<p>Similar requirement.</p>
<p>N45.2 ¶ 2 When inspection, measuring, and test 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.</p> <p>N18.7 ¶ 2 When calibration, testing, or other measuring devices are found to be out of calibration, an evaluation shall be made and documented concerning the validity of previous tests and the acceptability of devices previously tested from the time of the previous calibration.</p> <p>ANSI N45.2.1 § 2.5 Test Equipment 2.5.2 Calibration and Control. 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.</p> <p>N45.2.4 § 2.5 Measuring and Test Equipment 2.5.2 Calibration and Control. 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.</p> <p>N45.2.5 § 2.5 Measuring and Test Equipment. 2.5.2 Calibration and Control. Test equipment found to be out of calibration shall be clearly identified as such. 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.</p> <p>N45.2.8 § 2.8 Measuring and Test Equipment 2.8.2 Calibration and Control. 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. 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,</p>	<p>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.</p>	<p>Similar requirement.</p>

CRITERION 12 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 12 NQA-1 1994	COMMENTS
equipment or procedures, alternate inspections or tests agreeable to the responsible organizations may be used. N45.2.13 § 7.4 Measuring and Test Equipment 7.4.2 Calibration and Control. When inspection, measuring and test 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.		
N45.2.4 § 2.5 Measuring and Test Equipment 2.5.2 Calibration and Control. Test equipment found to be out of calibration shall be clearly identified as such.	Out-of-calibration devices shall be tagged or segregated and not used until they have been recalibrated.	Similar requirement.
N45.2 ¶ 2 If any inspection, measuring, or test equipment is consistently found to be out of calibration, it shall be repaired or replaced. N18.7 ¶ 2 If any calibration, testing or measuring device is consistently found to be out of calibration, it shall be repaired or replaced.	If any measuring or test equipment is consistently found to be out of calibration, it shall be repaired or replaced.	Similar requirement.
N45.2 ¶ 2 Special calibration shall be performed when accuracy of the equipment is suspect. N18.7 ¶ 4 Special calibration shall be performed when the accuracy of ... calibrating equipment is questionable.	A calibration shall be performed when the accuracy of the equipment is suspect.	Similar requirement.
	3.3 Commercial Devices	
N45.2 ¶ 1 This requirement is not intended to imply a need for special calibration and control measures on rulers, tape measures, levels, and such other devices, if normal commercial practices provide adequate accuracy. N18.7 ¶ 3 It is not the intent of this Standard to imply a need for special calibration and control measures on rulers, tape measures, levels and other such devices if normal commercial practices provide adequate accuracy.	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 requirement.
	4 HANDLING AND STORAGE	
N45.2.5 § 2.5 Measuring and Test Equipment. 2.5.2 Calibration and Control. Measures shall be taken to assure proper handling, storage and care of installation of inspection and testing equipment after calibration in order to maintain the required accuracy of such equipment. N45.2.8 § 2.8 Measuring and Test Equipment 2.8.2 Calibration and Control. 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.	Measuring and test equipment shall be properly handled and stored to maintain accuracy.	Similar requirement.

<p align="center">CRITERION 12 ANSI N45.2-77/ANSI N18.7-76</p>	<p align="center">BASIC REQUIREMENT 12 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>N45.2 ¶ 3 Records shall be maintained and equipment suitably marked to indicate calibration status.</p> <p>N18.7 ¶ 4 Records shall be made and equipment suitably marked to indicate calibration status.</p> <p>ANSI N45.2.1 § 2.5 Test Equipment 2.5.2 Calibration and Control. Records shall be maintained and equipment suitably marked to indicate calibration status.</p> <p>N45.2.2 § 2.5 Measuring and Test Equipment. 2.5.2 Calibration and Control. Records shall be maintained and equipment suitably marked to indicate calibration status.</p> <p>N45.2.4 § 2.5 Measuring and Test Equipment 2.5.2 Calibration and Control. Records of the calibrations shall be maintained and equipment suitably marked to indicate date of next required calibration.</p> <p>N45.2.5 § 2.5 Measuring and Test Equipment. 2.5.2 Calibration and Control. Records shall be maintained and equipment suitably marked to indicate calibration status.</p> <p>N45.2.8 § 2.8 Measuring and Test Equipment 2.8.2 Calibration and Control. Records of calibrations shall be maintained and equipment suitably marked so that the calibration status can be determined. Records of calibration shall be included in inspection and test results where applicable.</p> <p>N45.2.13 § 7.4 Measuring and Test Equipment 7.4.2 Calibration and Control. Records shall be maintained and equipment suitably marked to indicate calibration status or the records shall be traceable to the equipment.</p>	<p>5 RECORDS</p> <p>Records shall be maintained and equipment shall be suitably marked to indicate calibration status.</p>	<p>Similar requirement.</p>
<p>N45.2.8 § 2.8 Measuring and Test Equipment 2.8.2 Calibration and Control. ... Records of calibration shall be included in inspection and test results where applicable.</p>		<p>N45.2.8 addresses inclusion of records of calibration in with inspection and test results where applicable. This level of detail is not specifically addressed in NQA-1, but the intent is met through the standard for QA records.</p>

CRITERION 13 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 13 NQA-1 1994	COMMENTS
N45.2 § 14 / N18.7 § 5.2.13.4 unless otherwise noted.		
<p>N45.2 ¶ 1 Measures shall be established ... to control handling, storage, and shipping, including cleaning, packaging, and preservation of material and equipment... to prevent damage, deterioration, and loss.</p> <p>N18.7 ¶ 1 Measures shall be provided to control handling, storage and shipping, including cleaning, packaging and preservation of material and equipment ... to prevent damage, deterioration and loss.</p>	Handling, storage, cleaning, packaging, shipping, and preservation of items shall be controlled to prevent damage or loss and to minimize deterioration.	Similar requirement.
	SUPPLEMENT 13S-1 SUPPLEMENTARY REQUIREMENTS FOR HANDLING, STORAGE, AND SHIPPING	
	1 GENERAL	
	This Supplement provides amplified requirements for handling, storage, and shipping.	
	It supplements the requirements of Basic Requirement 13 of this Part (Part 1) and shall be used in conjunction with that Basic Requirement when and to the extent specified by the organization invoking this Part (Part 1).	
	2 INSTRUCTION	
<p>N45.2 ¶ 1 Measures shall be established and documented to control handling, storage and shipping ... in accordance with established instructions, procedures, or drawings to prevent damage, deterioration, and loss.</p> <p>N18.7 ¶ 1 Measures shall be provided to control handling, storage and shipping ... in accordance with established instructions, procedures or drawings, to prevent damage, deterioration and loss.</p>	Handling, storage, and shipping of items shall be conducted in accordance with established work and inspection instructions, drawings, specifications, shipment instructions, or other pertinent documents or procedures specified for use in conducting the activity.	Similar requirement.
	3 REQUIREMENTS	
	3.1 General	
<p>N45.2 ¶ 1 When necessary for particular items, special coverings, special equipment, and special protective environments such as inert gas atmosphere, specific</p>	When required for particular items, special equipment (such as containers, shock absorbers, and accelerometers) and special protective environments (such as inert gas	Similar requirement.

CRITERION 13 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 13 NQA-1 1994	COMMENTS
moisture content levels, and temperature levels shall be specified provided, and their existence verified. N18.7 ¶ 1 When necessary for particular items, special coverings, special equipment and special protective environments, such as inert gas atmosphere, specific moisture content levels and temperature levels shall be specified, provided, and their existence verified.	atmosphere, specific moisture content levels, and temperature levels) shall be specified, provided, and their existence verified.	
	3.2 Procedures	
N45.2 ¶ 2 For critical, sensitive, perishable, or high-value articles, specific written procedures for handling, storage, packaging, shipping, and preservation should be used. N18.7 ¶ 2 For critical, sensitive, perishable or high-value articles, specific written procedures for handling, storage, packaging, shipping and preservation should be used.	When required for critical, sensitive, perishable, or high-value articles, specific procedures for handling, storage, packaging, shipping, and preservation shall be used.	Similar requirement.
	3.3 Tools and Equipment	
N45.2 ¶ 2 Special handling tools and equipment should be provided and controlled as necessary to ensure safe and adequate handling. N18.7 ¶ 2 Special handling tools and equipment should be provided and controlled as necessary to ensure safe and adequate handling.	Special handling tools and equipment shall be utilized and controlled as necessary to ensure safe and adequate handling.	Changed from guidance to a requirement of NQA-1-1994.
N45.2 ¶ 3 Special handling tools and equipment shall be inspected and tested, in accordance with written procedures and at specified times, to verify that the tools and equipment are adequately maintained N18.7 ¶ 3 Special handling tools and equipment shall be inspected and tested in accordance with written procedures and at specified times, to verify that the tools and equipment are adequately maintained.	Special handling tools and equipment shall be inspected and tested in accordance with procedures and at specified time intervals to verify that the tools and equipment are adequately maintained.	Similar requirement.
	3.4 Operators	
	Operators of special handling and lifting equipment shall be experienced or trained in use of the equipment.	A similar requirement is currently contained in ANSI N45.2.2, § 7.5.
	4 MARKING	

CRITERION 13 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 13 NQA-1 1994	COMMENTS
<p>N45.2 ¶ 4 Special attention shall be given to providing adequate instructions for marking and labeling for packaging, shipment, and storage of items. Marking shall be adequate to identify, maintain, and preserve the shipment, including indication of the presence of special environments or the need for special control.</p> <p>N18.7 ¶ 4 Attention shall be given to providing adequate instructions for marking and labeling of items for packaging, shipment and storage. Marking shall be adequate to identify, maintain and preserve the shipment, including indication of the presence of special environments or the need for special control.</p>	<p>Instructions for marking and labeling for packaging, shipment, handling, and storage of items shall be established as necessary to adequately identify, maintain, and preserve the item, including indication of the presence of special environments or the need for special controls.</p>	<p>Similar requirement.</p>
<p>N18.7 ¶ 5 American National Standard for Packaging, Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants (During the Construction Phase), N45.2.2-1972, shall be applied to those activities occurring during the operational phase that are comparable in nature and extent to related activities occurring during construction.</p>		<p>ANSI N45.2.2 is addressed as NQA-1-1994, Subpart 2.2. A separate table is used to compare these two documents.</p>

CRITERION 14 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 14 NQA-1 1994	COMMENTS
N45.2 § 15 / N18.7 § 5.2.6 Unless otherwise noted.		
<p>N45.2, ¶ 1 Measures shall be established and documented to identify inspection and test status. Such measures shall provide means for assuring that required inspections and tests are performed and that the acceptability of items with regard to inspections and tests performed is known throughout manufacturing, installation, and operation.</p> <p>N45.2, ¶ 2 The measures shall provide for assuring that only items that have passed the required inspections and tests are used, installed, or operated.</p> <p>N18.7, § 5.2.6, ¶ 5 Procedures shall also 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. In cases where required documentary evidence is not available, the associated equipment or materials must be considered nonconforming in accordance with Section 5.2.14. Until suitable documentary evidence is available to show the equipment or material is in conformance, affected systems shall be considered to be inoperable and reliance shall not be placed on such systems to fulfill their intended safety functions.</p> <p>N18.7, § 5.2.7, ¶ 4 Measures shall be established and documented to identify the inspection and test status of items to be used in maintenance and modification activities. Normally, the point of control for such items should be the plant storage area.</p>	<p>The status of inspection and test activities shall be identified either on the items or in documents traceable to the items where it is necessary to assure that required inspections and tests are performed and to assure that items which have not passed the required inspections and tests are not inadvertently installed, used, or operated.</p>	<p>Similar requirement.</p>
<p>N45.2, ¶ 1 Nonconforming items shall be clearly identified.</p> <p>N45.2, ¶ 2 The inspection and test status of items shall be maintained through the use of status indicators such as physical location and tags, markings, shop travelers, stamps, or inspection records.</p> <p>N18.7, § 5.2.6, ¶ 2 Equipment and systems in a controlled status shall be clearly identified. Strict control measures for such equipment shall be enforced.</p>	<p>Status shall be maintained through indicators, such as physical location and tags, markings, shop travelers, stamps, inspection records, or other suitable means.</p>	<p>Similar requirement. Nonconforming items from N45.2 are further addressed by NQA-1 under Basic Requirement 15 and Supplement 15S-1.</p>

CRITERION 14 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 14 NQA-1 1994	COMMENTS
<p>N18.7, § 5.2.6, ¶ 5 The procedures shall also require that the status of inspections and tests performed upon individual items on the nuclear power plant be indicated by the use of markings such as stamps, tags, labels, routing cards, or other suitable means. Suitable means include identification numbers which are traceable to records of the status of inspections and tests.</p>		
<p>N45.2, ¶ 2 These measures shall include procedures for control of status indicators, including the authority for application and removal of tags, markings, labels, and stamps.</p> <p>N18.7, § 5.2.6, ¶ 1 Permission to release equipment or systems for maintenance shall be granted by designated operating personnel. Prior to granting permission, such operating personnel shall verify that the equipment or system can be released, and determine how long it may be out of service. Granting of such permission shall be documented.</p> <p>N18.7, § 5.2.6, ¶ 6 When equipment is ready to be returned to service, operating personnel shall place the equipment in operation and verify and document its functional acceptability.</p>	<p>The authority for application and removal of tags, markings, labels, and stamps shall be specified.</p>	<p>Similar requirement. NQA-1 doesn't add the detail regarding operating personnel verifying that equipment can be released and determining how long it can be released, or the return to service requirements. The QAPD, Section 14.2 addresses these issues.</p>
<p>N45.2, ¶ 3 Measures 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.</p> <p>N18.7, § 5.2.6, ¶ 4 Procedures shall be provided for control of equipment, as necessary, to maintain personnel and reactor safety and to avoid unauthorized operation of equipment. These procedures shall require control measures such as locking or tagging to secure and identify equipment in a controlled status. The procedures shall require independent verifications, where appropriate, to ensure that necessary measures, such as tagging equipment, have been implemented correctly.</p>	<p>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.</p>	<p>Similar requirement. Procedure requirements are addressed by NQA-1 in Basic Requirement 5. The company will commit to having procedures of the type stated in Reg. Guide 1.33, Appendix A (the same as the current commitment).</p>

CRITERION 14 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 14 NQA-1 1994	COMMENTS
<p>N18.7, § 5.2.6, ¶ 1 Attention shall be given to the potentially degraded degree of protection when one subsystem of a redundant safety system has been removed for maintenance.</p>		<p>NQA-1 does not provide guidance on this aspect of controlling equipment. The QAPD, Section 14.2 addresses these issues.</p>
<p>N18.7, § 5.2.6, ¶ 2 After permission has been granted to remove the equipment from service, it shall be made safe to work on. Measures shall provide for protection of equipment and workers.</p>		<p>NQA-1 does not provide guidance on this aspect of controlling equipment. The QAPD, Section 14.2 addresses these issues.</p>
<p>N18.7, § 5.2.6, ¶ 3 Conditions to be considered in preparing equipment for maintenance include, for example: shutdown margin; method of emergency core cooling; establishment of a path for decay heat removal; temperature and pressure of the system; valves between work and hazardous material; venting, draining and flushing; entry into closed vessels; hazardous atmospheres; handling hazardous materials; and electrical hazards. When entry into a closed system is required, control measures shall be established to prevent entry of extraneous material and to assure that foreign material is removed before the system is reclosed.</p>		<p>NQA-1 does not provide guidance on this aspect of controlling equipment. The QAPD, Section 14.2 addresses these issues.</p>
<p>N18.7, § 5.2.6, ¶ 5 Temporary modifications, such as temporary bypass lines, electrical jumpers, lifted electrical leads, and temporary trip point settings, shall be controlled by approved procedures which shall include a requirement for independent verification. A log shall be maintained of the current status of such temporary modifications.</p>		<p>NQA-1 does not provide guidance on this aspect of controlling equipment. Temporary modifications are addressed in QAPD, Section 14.2.</p>
<p>N18.7, § 5.2.6, ¶ 6 Attention shall be given to restoration of normal conditions, such as removal of jumpers or signals used in maintenance or testing or such as returning valves, breakers or switches to proper start-up or operating positions from "test" or "manual" positions. When placed into service, the equipment should receive additional surveillance during the run-in period.</p>		<p>NQA-1 does not provide guidance on this aspect of controlling equipment. QAPD, Section 14.2 addresses these issues.</p>

CRITERION 15 ANSI 45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 15 NQA-1 1994	COMMENTS
N45.2 § 16 / N18.7 § 5.2.14 Unless otherwise noted.		
N45.2, ¶1 Measures shall be established and documented to control items, services, or activities which do not conform to requirements. N18.7, ¶ 1 Measures shall be provided to control items, services or activities which do not conform to requirements (Note in N18.7 text: see also Section 5.2.6).	Items that do not conform to specified requirements shall be controlled to prevent inadvertent installation or use.	Similar requirement.
N45.2, ¶ 1 These measures shall include, as appropriate, procedures for identification, documentation, segregation, disposition, and notification to affected organizations. N18.7, ¶ 1 These procedures shall include as appropriate, instructions 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.	Similar requirement.
	SUPPLEMENT 15S-1 SUPPLEMENTARY REQUIREMENTS FOR THE CONTROL OF NONCONFORMING ITEMS	
	1 GENERAL	
	This Supplement provides amplified requirements for the control of nonconforming items.	
	It supplements the requirements of Basic Requirement 15 of this Part (Part I) and shall be used in conjunction with that Basic Requirement when and to the extent specified by the organization invoking this Part (Part I).	
	2 IDENTIFICATION	
N45.2, ¶ 2 Measures which control further processing, delivery, or installation of a nonconforming or defective item pending a decision on its disposition shall be established and maintained. ... Such measures shall provide assurance that the item is identified as nonconforming and controlled. N45.2, ¶ 3 As a guideline, control of nonconforming items by tagging, marking, or other means of identification is acceptable where physical segregation is not practical, although physical segregation and marking are preferred. N18.7, ¶ 2 Measures which control further processing, delivery or installation of a nonconforming or defective item pending a decision on its disposition shall be established and maintained. ... Such measures shall provide assurance that the item is identified as	(a) Identification of nonconforming items shall be by marking, tagging, or other methods which shall not adversely affect the end use of the item. The identification shall be legible and easily recognizable. (b) If identification of each nonconforming item is not practical, the container, package, or segregated storage area, as appropriate, shall be identified.	Similar requirement.

CRITERION 15 ANSI 45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 15 NQA-1 1994	COMMENTS
nonconforming and controlled. N18.7, ¶ 2 As a guideline, control of nonconforming items by tagging, marking or other means of identification is acceptable where physical segregation is not practical, although physical segregation and marking are preferred.		
	3 SEGREGATION	
N45.2, ¶ 3 As a guideline, control of nonconforming items by tagging, marking, or other means of identification is acceptable where physical segregation is not practical, although physical segregation and marking are preferred. N18.7, ¶ 3 As a guideline, control of nonconforming items by tagging, marking or other means of identification is acceptable where physical segregation is not practical, although physical segregation and marking are preferred.	(a) Nonconforming items shall be segregated, when practical, by placing them 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.	Similar requirement.
	4 DISPOSITION	
	4.1 Control	
N45.2, ¶ 1 Nonconforming items shall be reviewed and accepted, rejected, repaired, or reworked in accordance with documented procedures. N18.7, ¶ 1 Nonconforming items shall be reviewed and accepted, rejected, repaired or reworked in accordance with documented procedures.	Nonconforming characteristics shall be reviewed and recommended dispositions of nonconforming items shall be proposed and approved in accordance with documented procedures.	Similar requirement. The four types of dispositions are addressed in 4.4 of the NQA-1 standard
N45.2, ¶ 2 Measures which control further processing, delivery, or installation of a nonconforming or defective item pending a decision on its disposition shall be established and maintained. ... Such measures shall provide assurance that the item is identified as nonconforming and controlled. N18.7, ¶ 2 Measures which control further processing, delivery or installation of a nonconforming or defective item pending a decision on its disposition shall be established and maintained. ... Such measures shall provide assurance that the item is identified as nonconforming and controlled.	Further processing, delivery, installation, or use of a nonconforming item shall be controlled pending an evaluation and an approved disposition by authorized personnel.	Similar requirement.
	4.2 Responsibility and Authority	
N45.2, ¶ 1 The responsibility and authority for the disposition of nonconforming items shall be defined. N18.7 – The responsibility and authority for the disposition of nonconforming items shall be defined.	The responsibility and authority for the evaluation and disposition of nonconforming items shall be defined.	Similar requirement.

CRITERION 15 ANSI 45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 15 NQA-1 1994	COMMENTS
	4.3 Personnel	
	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.	This requirement from NQA-1 was not specifically addressed in the corresponding sections of the ANSI Standards, but is a requirement of the training and qualification standard.
	4.4 Disposition	
<p>N45.2, ¶ 2 Nonconforming items may be disposed of by acceptance "as is," by scrapping or repairing the defective item, or by rework to complete or correct to a drawing or specification.</p> <p>N18.7, ¶2 Nonconforming items may be disposed of by acceptance "as is," by scrapping or repairing the defective item, or by rework to complete or correct to a drawing or specification.</p>	The disposition, such as use-as-is, reject, repair, or rework, of nonconforming items shall be identified and documented.	Similar requirement.
<p>N45.2, ¶ 2 The measures shall require documentation verifying the acceptability of nonconforming items which have the disposition of repair or use as is.</p> <p>N18.7, ¶ 2 The measures shall require documentation verifying the acceptability of nonconforming items which have the disposition of "repair" or "use as is."</p>	Technical justification for the acceptability of a nonconforming item, dispositioned repair, or use-as-is shall be documented.	Similar requirement. NQA-1 is more specific that the content of the documentation include technical justification.
	Nonconformances to design requirements dispositioned use-as-is or repair shall be subject to design control measures commensurate with those applied to the original design.	This requirement from NQA-1 was not specifically addressed in the corresponding sections of the ANSI Standards, but is in line with requirements of the design and procurement standards.
<p>N45.2, ¶ 2 A description of the change, waiver, or deviation that has been accepted shall be documented to record the change and denote the as-built condition.</p> <p>N18.7, ¶ 2 A description of the change, waiver or deviation that has been accepted shall be documented to record the change and denote the as-built condition.</p>	The as-built records, if such records are required, shall reflect the accepted deviation.	Similar requirement.
	4.5 Repaired or Reworked Items	
<p>N45.2, ¶ 1 Repaired and reworked items shall be reinspected in accordance with applicable procedures.</p> <p>N18.7, ¶ 1 Repaired and reworked items shall be reinspected in accordance with applicable procedures.</p>	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.	Similar requirement. NQA-1 further addresses the acceptance criteria to use in the inspection/examination.

CRITERION 16 ANSI N45.2-77/ANSI N18.7-76	BASIC REQUIREMENT 16 NQA-1 1994	COMMENTS
N45.2 § 17 / N18.7 § 5.2.11		
<p>N45.2, ¶ 1 Measures shall be established and documented to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances, are promptly identified and corrected as soon as practicable.</p> <p>N18.7, ¶ 1 The program shall provide measures to ensure that conditions adverse to plant safety, such as failure, malfunctions, deficiencies, deviations, defective material and equipment, abnormal occurrences, and nonconformances are promptly identified and corrected.</p>	<p>Conditions adverse to quality shall be identified promptly and corrected as soon as practical.</p>	<p>Similar requirement. NQA-1 defines “Condition adverse to quality” as “failures, malfunctions, deficiencies, deviations, defective items, and nonconformances.”</p>
<p>N45.2, ¶ 1 In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition.</p> <p>N18.7, ¶ 1 In the case of significant conditions adverse to safety, the measures shall assure that the cause of the condition is determined and corrective action taken</p>	<p>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.</p>	<p>Similar requirement.</p>
<p>N45.2, ¶ 1 The identification of significant conditions adverse to quality, the cause of the condition, and the corrective action taken shall be documented and reported to appropriate levels of management.</p> <p>N18.7, ¶ 1 - In the case of significant conditions adverse to safety, the measures shall assure that the cause of the condition is determined and corrective action taken shall be documented and reported to appropriate levels of management and for independent review in accordance with Section 4.3.</p>	<p>The identification, cause, and corrective action for significant conditions adverse to quality shall be documented and reported to appropriate levels of management;</p>	<p>Similar requirement. N18.7 addresses the need for independent review. This is addressed under the requirements for independent review within the QAPD.</p>
	<p>follow-up action shall be taken to verify implementation of this corrective action.</p>	<p>New stated requirement from NQA-1. This is in line with the intent of the current standards regarding corrective action precluding recurrence.</p>

CRITERION 17 ANSI 45.2-77/ANSI N18.7-76/ANSI N45.2.9	BASIC REQUIREMENT 17 NQA-1 1994	COMMENTS
N45.2 § 18 / N18.7 § 5.2.12 unless otherwise noted.		
N45.2, ¶ 1 Sufficient records shall be prepared as work is performed to furnish documentary evidence of the quality of items and of activities affecting quality. N18.7, ¶ 1 Provisions shall be made for preparation and retention of plant records as appropriate.	Records that furnish documentary evidence of quality shall be specified, prepared, and maintained.	Similar requirement.
N45.2, ¶ 2 Required records shall be legible, identifiable, and retrievable. N18.7, ¶ 1 American National Standard Requirements for Collection, Storage and Maintenance of Quality Assurance Records for Nuclear Power Plants, N45.2.9-1974, shall be used for management of plant records during the operational phase.	Records shall be legible, identifiable, and retrievable.	Similar requirement. N18.7 refers to N45.2.9 for management of records. N45.2.9 is compared with NQA-1 Basic and Supplementary Requirements below.
N45.2, ¶ 4 These records shall be indexed, filed, and maintained in facilities that provide suitable environment to minimize deterioration or damage and to prevent loss.	Records shall be protected against damage, deterioration, or loss.	Similar requirement.
N45.2, ¶ 3 Requirements and responsibilities for record transmittal, retention, and maintenance subsequent to completion of work shall be established and documented consistent with applicable codes, standards, and procurement documents. N18.7, ¶ 1 The responsibility for maintaining records and storing them at a specified location or locations shall be assigned. Retention periods of sufficient duration to assure the ability to reconstruct significant events and satisfy any statutory requirements which apply shall be specified. N45.2.9 § 2. GENERAL REQUIREMENTS This section sets forth general requirements for the control of quality assurance records. The requirements include collection, filing, storing, maintenance and disposition of records that are required by other codes, standards, specifications, or regulatory requirements. The procedures to be employed to perform the required activities shall be planned and documented.	Requirements and responsibilities for record transmittal, distribution, retention, maintenance, and disposition shall be established and documented.	Similar requirement.

CRITERION 17 ANSI 45.2-77/ANSI N18.7-76/ANSI N45.2.9	BASIC REQUIREMENT 17 NQA-1 1994	COMMENTS
	SUPPLEMENT 17S-1 Supplementary Requirements for Quality Assurance Records	
	1 GENERAL	
N45.2.9 § 1. INTRODUCTION 1.1 Scope This standard provides general requirements and guidelines for the collection, storage, and maintenance of quality assurance records associated with the design, manufacture, construction, and operation phase activities of nuclear power plants. It is not intended to cover the preparation of the records, nor to include working documents not yet designated as quality assurance records.	This Supplement provides amplified requirements for quality assurance records. It supplements the requirements of Basic Requirement 17 of this Part (Part I) and shall be used in conjunction with that Basic Requirement when and to the extent specified by the organization invoking this Part (Part I). The requirements of this Supplement apply to quality assurance records which have been completed. The term records, used throughout this Supplement, is to be interpreted as Quality Assurance Records.	NQA-1 further addresses applicability in the Introduction to Part I.
	2 RECORDS ADMINISTRATION	
	2.1 Records System	
N45.2.9 § 2.1 Quality Assurance Record System A quality assurance records system shall be established by the organization responsible at the earliest practicable time, consistent with the schedule for accomplishing work activities and in compliance with the general requirements of this standard. The quality assurance records system shall be defined, implemented and enforced in accordance with written procedures, instructions and other documentation.	A records system(s) shall be established by the organization responsible at the earliest practicable time consistent with the schedule for accomplishing work activities and in compliance with the general requirements of this Supplement. The records system(s) shall be defined, implemented, and enforced in accordance with written procedures, instructions, or other documentation.	Similar requirement.
N45.2.9 § 3. TECHNICAL REQUIREMENTS 3.1 General This section provides requirements for the retention and control of those records generated during the various phases of the project.		Introductory statement, no requirements specified.
	2.2 Generation of Records	
N45.2, ¶ 1 Records shall be consistent with applicable codes, standards, specifications, and contracts and shall be adequate for use in management of the program. N45.2.9 § 3.2.1 Generation of Quality Assurance Records. It is not the intent of this standard to specify the preparation of the quality assurance records to be generated. The applicable design specifications, procurement documents, test procedures, operational	The applicable design specifications, procurement documents, test procedures, operational procedures, or other documents shall specify the records to be generated, supplied, or maintained by or for the Owner.	Similar requirement.

CRITERION 17 ANSI 45.2-77/ANSI N18.7-76/ANSI N45.2.9	BASIC REQUIREMENT 17 NQA-1 1994	COMMENTS
procedures or other documents shall specify the quality assurance records to be generated by, supplied to, or held for the owner.		
<p>N45.2, ¶ 2 The records shall include the results of reviews, inspections, tests, audits, monitoring of work performance, materials analyses, and facility operating logs. The records shall also include, as appropriate, closely related data such as qualifications of personnel, procedures, and equipment and other documentation required by the applicable parts of this standard. Inspection and test records shall, as a minimum, identify the date of inspection or test, the inspector or data recorder; the type of observation, the results, the acceptability, and the action taken in connection with any deficiencies noted.</p> <p>N45.2.9 § 3.2.1 All such quality assurance records shall be legible, completely filled out and adequately identifiable to the item involved.</p>	Documents that are designated to become records shall be legible, accurate, and completed appropriate to the work accomplished.	Similar requirement. NQA-1 identifies appropriate related data in the sections governing specific activities.
	2.3 Record Validation	
<p>N45.2.9 § 3.2.1 The applicable quality assurance records shall be considered valid only if stamped, initialed, signed, or otherwise authenticated and dated by authorized personnel. These records may be either the original or a reproduced copy.</p>	Documents shall be considered valid records only if stamped, initialed, or signed and dated by authorized personnel or otherwise authenticated. 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.	Similar requirement. NQA-1 further describes authentication that allows for electronic processing of records.
	2.4 Index	
<p>N45.2.9 § 3.2.2 Index. The quality assurance records shall be listed in an index.</p>	The records shall be indexed.	Similar requirement.
<p>N45.2.9 § 3.2.2 The index shall indicate, as a minimum, record retention times, where the records are to be stored and the location of the records within the storage area. The index should be established prior to receipt of the records. Index systems used by organizations for the retention of project records should include sufficient identifying information to be compatible with the index system used by the owner for final storage of records.</p> <p>Alternative from current VA QA Topical Report - (1)</p>	The indexing system(s) shall include, as a minimum, record retention times and the location of the record within the record system.	Similar requirement. N45.2.9 contains information for records on a construction project and compatibility with the owner's record system. This requirement would be addressed by the purchase and interface requirements of other related standards. The VA alternative is no longer necessary since the NQA-1 standard

CRITERION 17 ANSI 45.2-77/ANSI N18.7-76/ANSI N45.2.9	BASIC REQUIREMENT 17 NQA-1 1994	COMMENTS
<p>With regard to Section 3.2.2 of ANSI N45.2.9-1974, titled Index: The phrase “an index” is clarified to mean a collection of documents or indices which, when taken together, supply the information attributed to “an index” in the standard. The specific location of a record “within a storage area” may not be delineated (e.g., The specific location within a computer record file may not be constant. Further, the Company may utilize a computer assisted random access filing system where such location could not be readily “documented”, nor would such a location be “relevant”). The storage location will be delineated, but where file locations change within time, the specific location of a record within that file may not always be documented. Clarifications and alternatives meet or exceed applicable guides and standards.</p>		<p>addresses the indexing system(s). Regarding the location within the system, the indexing system(s) should still get you to the location in some manner whether through a link or a file location/path, disk number and file name, or some similar, but appropriate, location description. NQA-1 incorporates current technological advances (computer databases, etc.)</p>
	<p>2.5 Distribution</p> <p>The records shall be distributed, handled, and controlled in accordance with written procedures.</p>	<p>Similar requirement.</p>
	<p>2.6 Identification</p> <p>Records and/or indexing system(s) shall provide sufficient information to permit identification between the record and the item(s) or activity(ies) to which it applies.</p>	<p>Similar requirement.</p>
<p>N45.2.9 § 2.2 Categories Two categories of quality assurance records are established – lifetime and nonpermanent. N45.2.9 § 3.2.5 Classification. Quality assurance records shall be classified as "Lifetime" or "Nonpermanent" in accordance with Section 2 of this standard.</p>	<p>2.7 Classification</p> <p>Records shall be classified as Lifetime or Nonpermanent by the Owner, or his agent when authorized, in accordance with the criteria given in paras. 2.7.1 and 2.7.2 below.</p>	<p>Similar requirement.</p>
<p>N45.2, ¶ 4 In general, records which correctly identify the as-built conditions of items in the nuclear facility shall be maintained for the life of the particular item while it is installed in the nuclear facility and stored for future use by or for the owner. These records should include material certification and test data for traceability and quality</p>	<p>2.7.1 Lifetime Records.</p> <p>Lifetime records are those that meet one or more of the following criteria: (a) those which would be of significant value in demonstrating capability for safe operation; (b) those which would be of significant value in maintaining, reworking, repairing, replacing, or modifying</p>	<p>Similar requirement.</p>

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<p>verification; reports of inspections, examinations, and test results for conformance verification; drawings, specifications, procedures, and instructions for use in control of configuration; and records of nonconformances, and their resolution.</p> <p>N45.2.9 § 2.2.1 Lifetime Quality Assurance Records. Lifetime records are those which meet one or more of the following criteria:</p> <ol style="list-style-type: none"> 1. Those which would be of significant value in demonstrating capability for safe operation. 2. Those which would be of significant value in maintaining, reworking, repairing, replacing, or modifying the item. 3. Those which would be of significant value in determining the cause of an accident or malfunction of an item. 4. Those which provide required baseline data for inservice inspection. 	<p>an item;</p> <p>(c) those which would be of significant value in determining the cause of an accident or malfunction of an item;</p> <p>(d) those which provide required baseline data for inservice inspections.</p>	
<p>N45.2.9 § 2.2.1 Lifetime quality assurance records are required to be maintained by or for the plant owner for the life of the particular item while it is installed in the plant or stored for future use.</p> <p>Alternative from current VA QA Topical Report - (15) Consistent with ANSI N45.2.9, Section 2.2, the definition of lifetime for record retention is footnoted as follows:</p> <ol style="list-style-type: none"> a. Lifetime is (1) until the termination of the Facility Operating License; (2) until termination of employment (training and qualification records); (3) transfer of ownership (i.e., fuel); or (4) service life of the facility, system, or component, as applicable. 	<p>Lifetime records are required to be maintained by or for the plant owner for the life of the particular item while it is installed in the plant or stored for future use.</p>	<p>Similar requirement. The VA definition of Lifetime Record is retained as a definition in the new QAPD to ensure consistent application of the QA requirements.</p>
	<p>2.7.2 Nonpermanent Records.</p>	
<p>N45.2.9 § 2.2.2 Nonpermanent Quality Assurance Records. Nonpermanent records are those which meet all of the following criteria:</p> <ol style="list-style-type: none"> 1. Those of no significant value in demonstrating capability for safe operation. 2. Those of no significant value in maintaining, reworking, repairing, replacing, or modifying the item. 	<p>Nonpermanent records are those required to show evidence that an activity was performed in accordance with the applicable requirements but need not be retained for the life of the item because they do not meet the criteria for lifetime records.</p>	<p>Similar requirement. NQA-1 eliminated the use of this list by referring to records that do not meet the criteria for lifetime records.</p>

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<p>3. Those of no significant value in determining the cause of an accident or malfunction of an item.</p> <p>4. Those which do not provide baseline data for inservice inspection.</p> <p>Nonpermanent records are required to show evidence that an activity was performed in accordance with the applicable requirements but need not be retained for the life of the item.</p>		
<p>N18.7 Retention periods of sufficient duration to assure the ability to reconstruct significant events and satisfy any statutory requirements which apply shall be specified.</p> <p>N45.2.9 § 3.2.7 Retention of Records. Types of quality assurance records with recommended minimum retention periods are listed in Appendix A of this standard. It should be recognized that the nomenclature of these records may vary. For records not listed in Appendix A, the type most nearly describing the record in question should be followed with respect to its retention period.</p> <p>For records generated prior to commercial operation, the retention period begins on the date of commercial operation. For records generated on items installed after commercial operation, the retention period begins on the date upon which satisfactory operation of the item, as part of a system, has been demonstrated. For periodic maintenance, inspection and test records, such as calibration records, generated after the date of commercial operation, the retention time begins on the date of their generation. When a record is generated as a result of an operational phase activity, the classification of those records will be the same as those types of records generated during the initial construction period.</p> <p>The organization responsible shall establish in writing the retention times of records not listed in Appendix A. (Note: The content of Appendix A is inserted at the end of this comparison table.)</p> <p>Alternative from current VA QA Topical Report - (12) With regard to Section A.6 of Appendix A to ANSI</p>	<p>2.8 Retention of Records</p> <p>Records shall be retained in accordance with the above classifications. The retention period for nonpermanent records shall be established in writing.</p> <p>NRC Reg. Guide 1.28, Rev. 3, Regulatory Position C.2. Section 2.8, "Retention of Records," of Supplement 17S-1, "Supplementary Requirements for Quality Assurance Records," states that the retention period for nonpermanent records is required to be established in writing. Programmatic nonpermanent records⁴ should be retained for at least 3 years and product nonpermanent records⁵ should be retained for at least 10 years. For programmatic nonpermanent records, the retention period should be considered to begin upon completion of the activity. For product nonpermanent records generated before commercial operation begins, the retention period should be considered to begin upon completion of delivery. In addition, product and programmatic nonpermanent records should be retained at least until the date of issuance of the full-power operating license of the unit. Table 1 provides a list of nonpermanent and lifetime records and their respective retention times. Although Table 1 is intended to be a comprehensive list, it is the responsibility of the owner to assure itself, in accordance with Criterion 17 of Appendix B to 10 CFR 50, that sufficient records are maintained to furnish evidence of activities affecting quality. It should be recognized that the nomenclature of these records may vary. For records not listed in Table 1, the type most nearly describing the record in question should be followed with respect to its retention period.</p>	<p>Similar requirement as far as establishing retention periods. NQA-1 doesn't contain a mandatory Appendix listing record types and retention periods. It does contain a nonmandatory appendix with this type of information as Appendix 17A-1. NRC Reg. Guide 1.28 does establish a regulatory position on the types of records and the duration or retention. The new QAP commits to meeting the record requirements of Reg. Guide 1.28. In addition a table of operations phase records is included in the QAPD to supplement the construction phase records of the Reg. Guide.</p>

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<p>N45.2.9-1974 entitled, <i>Operation Phase Activity Records</i>, Section A.6.1, "Operation, Maintenance & Testing," is replaced by the information in Table 17.2-2. (Note: The content of this table is inserted directly after the table of Appendix A from N45.2.9)</p> <p>Alternative from current VA QA Topical Report - (13) For the collection, storage and maintenance of electronically stored QA records, see Section 17.2.17 of the QA Topical Report.</p>	<p>(Note: The content of Table 1 is inserted following the contents from N45.2.9, Appendix A, and the VA Table that replaces Appendix A)</p> <hr/> <p>Footnote 4 – Programmatic nonpermanent records are those documents that were used to prescribe activities affecting quality but that are not considered permanent records. Such records include documents prescribing the planning, execution, and auditing of activities affecting quality. Records such as audit checklists, audit results, and actual examinations used to qualify inspection and test personnel are included in this category.</p> <p>Footnote 5 – Product nonpermanent records document that specific structures, systems, and components of a nuclear power plant have been designed and constructed in accordance with applicable requirements but are such that it is not necessary to retain them as lifetime records. These records include design verification data, receiving records, calibration records, maintenance records, inspection records, radiographs not associated with inservice inspection, and test records that are not otherwise designated as lifetime records.</p>	
<p>N45.2.9 § 3.2.6 Supplemental Information to Quality Assurance Records. Quality assurance records may be corrected or supplemented in accordance with procedures which provide for appropriate review or approval by the originating organization. The correction or supplement shall include the date and the identification of the person authorized to issue such corrections or supplements.</p>	<p>2.9 Corrected Information in Records</p> <p>Records may be corrected in accordance with procedures which provide for appropriate review or approval by the originating organization. The correction shall include the date and the identification of the person authorized to issue such correction.</p>	<p>Similar requirement.</p>
	<p>3 RECEIPT</p>	
	<p>3.1 Responsibility</p>	
<p>N45.2, ¶ 4 These records shall be ... maintained in facilities that provide suitable environment to minimize deterioration or damage and to prevent loss.</p> <p>N45.2.9 § 1.3 Responsibility The organization or organizations responsible for establishing the applicable requirements for the activities</p>	<p>The individual or organization responsible for receiving records shall provide protection from damage or loss during the time that the records are in their possession.</p>	<p>Similar requirement.</p>

CRITERION 17 ANSI 45.2-77/ANSI N18.7-76/ANSI N45.2.9	BASIC REQUIREMENT 17 NQA-1 1994	COMMENTS
<p>covered by this standard shall be identified and the scope of their responsibilities shall be documented. The work of establishing practices and procedures and providing the resources in terms of personnel, facilities, and services necessary to implement the requirements of this standard may be delegated to other organizations and such delegation shall also be documented. It is the responsibility of each organization performing work covered by this standard to comply with requirements of this standard applicable to its work.</p> <p>N45.2.9 § 4. RECEIPT OF RECORDS</p> <p>4.1 General</p> <p>This section defines requirements for receipt of documentation During the design, procurement, manufacturing, installation, startup and operation of a nuclear power plant.</p> <p>The designated authority or authorities for receiving quality assurance records shall be aware of the value of such records and shall control their safety during the time that the records are in their possession.</p>		
	3.2 Receipt Control	
<p>N45.2.9 § 4.3 Receipt Control</p> <p>Each organization responsible for the receipt of quality assurance records shall designate a person or agency responsible for receiving the records.</p>	<p>Each organization responsible for the receipt of records shall designate a person or organization responsible for receiving the records.</p>	<p>Similar requirement.</p>
<p>N45.2.9 § 4.3 The designated authority shall be responsible for organizing and implementing a system of receipt control of quality assurance records.</p>	<p>The designee shall be responsible for organizing and implementing a system of receipt control of records for permanent and temporary storage.</p>	<p>Similar requirement.</p>
<p>N45.2.9 § 4.3 As a minimum, a receipt control system shall include:</p>	<p>As a minimum, a receipt control system shall include the following:</p>	<p>Similar requirement.</p>
<p>N45.2.9 § 4.3 - 1. A records check list designating the required quality assurance records.</p>	<p>(a) a method for designating the required records;</p>	<p>Similar requirement.</p>
<p>N45.2.9 § 4.3 - 2. A record of quality assurance records received.</p>	<p>(b) a method for identifying records received;</p>	<p>Similar requirement.</p>
<p>N45.2.9 § 4.3 - 3. Procedures for receipt and inspection of incoming records.</p>	<p>(c) procedures for receipt and inspection of incoming records;</p>	<p>Similar requirement.</p>
<p>N45.2.9 § 4.2 Timeliness</p> <p>To assure their availability, a specific submittal plan shall</p>	<p>(d) a method for submittal of completed records to the storage facility without unnecessary delay.</p>	<p>NQA-1 broadens the requirement by not limiting it to just a supplier.</p>

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<p>be established for quality assurance records by agreement between the purchaser and supplier.</p> <p>Alternative from current VA QA Topical Report - (2) With regard to Section 4.2 of ANSI N45.2.9-1974, titled Timeliness: The Company's contractual agreement with its contractors and suppliers will constitute fulfillment of the requirements of this Section.</p>		<p>The VA alternative is no longer necessary since the "method" for submittal of completed records by a Supplier could be through a contractual agreement.</p>
	3.3 Status	
<p>N45.2.9 § 4.3 This system shall apply to the receipt of records into a temporary working file and the permanent storage file.</p> <p>N45.2.9 § 4.4 Status Each receipt control system shall be structured to permit a current and accurate assessment of the status of quality assurance records during the receiving process.</p>	<p>Each receipt control system shall be structured to permit a current and accurate assessment of the status of records during the receiving process.</p>	<p>Similar requirement.</p>
<p>N45.2.9 § 5. STORAGE, PRESERVATION AND SAFEKEEPING</p> <p>5.1 General</p> <p>This section establishes storage requirements for the maintenance, preservation and protection of quality assurance record files from the time of receipt until their ultimate disposal.</p>	<p>4 STORAGE, PRESERVATION, AND SAFEKEEPING</p>	<p>Lead in statement, no requirements.</p>
	4.1 Storage	
<p>N45.2, ¶ 1 Records shall be consistent with applicable codes, standards, specifications, and contracts and shall be adequate for use in management of the program.</p> <p>N45.2.9 § 5.2 Location of Facilities</p> <p>The quality assurance record files shall be stored in predetermined locations as necessary to meet the requirements of applicable standards, codes, and regulatory agencies.</p>	<p>The records shall be stored in predetermined location(s) that meet the requirements of applicable standards, codes, and regulatory agencies.</p>	<p>Similar requirement.</p>
<p>N45.2.9 § 5.3 Storage - Prior to storage of records in a quality assurance record file, a written storage procedure shall be prepared and a custodian shall be designated with the responsibility to enforce the procedure.</p>	<p>Prior to storage of records, a written storage procedure shall be prepared and responsibility assigned for enforcing the requirements of that procedure.</p>	<p>Similar requirement.</p>
<p>N45.2.9 § 5.3 This procedure shall include the following as a minimum:</p> <p>1. A description of the storage area.</p>	<p>This procedure shall include, as a minimum, (a) through (g) below:</p> <p>(a) a description of the storage facility;</p>	<p>Similar requirement.</p>

CRITERION 17 ANSI 45.2-77/ANSI N18.7-76/ANSI N45.2.9	BASIC REQUIREMENT 17 NQA-1 1994	COMMENTS
2. The filing system to be used. 3. A method for verifying that the records received are in agreement with the transmittal document and that the records are in good condition. 4. A method of verifying that the records agree with the pre-established records check list (see paragraph 4.3). 5. The rules governing access to and control of the files. 6. A method for maintaining control of and accountability for records removed from the storage facility. 7. A method for filing supplemental information (see paragraph 3.2.6) and disposing of superseded records.	(b) the filing system to be used; (c) a method for verifying that the records received are in agreement with the transmittal document and that the records are legible; (d) a method of verifying that the records are those designated (see para. 3.2 above); (e) the rules governing access to and control of the files; (f) a method for maintaining control of and accountability for records removed from the storage facility; (g) a method for filing supplemental information (see para. 2.9 above) and disposing of superseded records.	
	4.2 Preservation	
N45.2.9 § 5.4 Preservation Records shall be stored in a manner approved by the organization or organizations responsible for the files.	Records shall be stored in a manner approved by the organization or organizations responsible for storage.	Similar requirement.
N45.2.9 § 5.4 In order to preclude deterioration of the records the following requirements shall apply:	In order to preclude deterioration of the records, the requirements of (a) through (c) below shall apply.	Similar requirement.
N45.2.9 § 5.4 - 1. Condensation. Provisions shall be made in the storage arrangement to prevent damage from condensation.	(a) Provisions shall be made in the storage arrangement to prevent damage from moisture, temperature, and pressure.	Similar requirement.
N45.2.9 § 5.4 - 2. Loose Records. Records shall not be stored loosely. They shall be firmly attached in binders or placed in folders or envelopes for storage on shelving in containers. Steel file cabinets are preferred. Alternative from current VA QA Topical Report - (3) With regard to Section 5.4 of ANSI N45.2.9-1974, titled Preservation : The following clarification is substituted for the current subsection 5.4.2: “Records shall be stored in enclosed containers, cabinets or other comparable document storage hardware.”	(b) Records shall be firmly attached in binders or placed in folders or envelopes for storage in steel file cabinets or on shelving in containers.	Similar requirement. Alternative is no longer needed. NQA-1 allows cabinets or containers and is broad enough of a description to include “other comparable document storage hardware.”

CRITERION 17 ANSI 45.2-77/ANSI N18.7-76/ANSI N45.2.9	BASIC REQUIREMENT 17 NQA-1 1994	COMMENTS
<p>N45.2.9 § 5.4 - 3. Special Processed Records. Special processed records (such as radiographs, photographs, negatives, and microfilm) which are light-sensitive, pressure sensitive or temperature sensitive shall be packaged and stored as recommended by the manufacturer of these materials.</p> <p>Alternative from current VA QA Topical Report - The following clarification is substituted for the current subsection 5.4.3 “Provisions shall be made for special processed records (such as radiographs, photographs, negatives, microfilm and magnetic media) to prevent damage as appropriate to the record type and will address the manufacturer’s recommendations.”</p>	<p>(c) Provisions shall be made for special processed records (such as radiographs, photographs, negatives, microform, and magnetic media) to prevent damage from excessive light, stacking, electromagnetic fields, temperature, and humidity.</p>	<p>Similar requirement. Alternative is no longer required.</p>
<p>N45.2.9 § 5.5 Safekeeping A full time security system shall be established to preclude the entry of unauthorized personnel into the storage area.</p> <p>Alternative from current VA QA Topical Report - (4) With regard to Section 5.5 of ANSI N45.2.9-1974, titled Safekeeping: Routine general office and nuclear site security systems and access controls are provided.</p>	<p>4.3 Safekeeping Measures shall be established to preclude the entry of unauthorized personnel into the storage area.</p>	<p>NQA-1 reduced the need for a “full-time security system” to measures to “preclude the entry of unauthorized personnel.” Alternative is no longer required.</p>
<p>N45.2.9 § 5.5 - This system shall guard against larceny and vandalism.</p>	<p>These measures shall guard against larceny and vandalism.</p>	<p>Similar requirement.</p>
	<p>Measures shall be taken to provide for replacement, restoration, or substitution of lost or damaged records.</p>	<p>New requirement that was not addressed in N45.2.9.</p>
<p>N45.2.9 § 5.6 Facility Permanent and temporary record storage facilities shall be so constructed or located as to protect contents from possible destruction by causes such as fire, flooding, tornadoes, insects, rodents and from possible deterioration by a combination of extreme variations in temperature and humidity conditions.</p> <p>N45.2.9 § 5.6 - For storage of film and other special processed records, humidity and temperature controls shall be provided to maintain an environment as recommended by the manufacturer.</p>	<p>4.4 Storage Facilities Records shall be stored in facilities constructed and maintained in a manner which minimizes the risk of damage or destruction from the following: (a) natural disasters such as winds, floods, or fires; (b) environmental conditions such as high and low temperatures and humidity; (c) infestation of insects, mold, or rodents.</p>	<p>Similar requirements.</p>
<p>N45.2.9 § 5.6 - A satisfactory alternative to the</p>	<p>There are two satisfactory methods of providing storage</p>	<p>Similar requirement.</p>

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establishing of a record storage facility is maintenance of duplicate records stored in a separate remote location.	facilities, single or dual.	
<p>N45.2.9 § 5.6 - Records discussed in this standard are appropriately classified for fire protection purposes as National Fire Protection Association Class 1 and as such should be afforded the equivalent protection of a NFPA Class A, four hour minimum rated facility.</p> <p>Alternative from Current VA Topical Report - Regulatory Guide 1.88— <i>Collection, Storage and Maintenance of Nuclear Power Plant Quality Assurance Records</i> - (Rev. 2, 10/76) - Endorses ANSI N45.2.9-1974 The Operational Quality Assurance Program complies with this guide with the following clarifications and alternatives: These proposals are the results of experience gained at operating nuclear facilities for over a decade. As with all guides and standards, additional clarity is sometimes required. Further the alternative (6) presented herein reflects the “as-built” condition of the Company’s records storage facilities. These facilities were constructed prior to any regulatory position being defined, and, at the time of construction, were considered more than adequate to assure permanent records retention. The discrepancies which might exist between current guides and standards and “as-built” conditions are more than compensated for by other more stringent measures such as: a) constant surveillance of the facility both by monitoring devices, security patrols, and fire inspections, and b) Permanently installed dedicated fire suppression apparatus.</p> <p>Alternative from current VA QA Topical Report - (5) With regard to Section 5.6 of ANSI N45.2.9-1974, titled Facility: Records shall be forwarded to the appropriate records storage facility promptly after completion when required processing and reviews have been completed.</p>		Not a requirement. Alternatives were contained in all the current QA programs to reduce the fire protection rating down from 4 to 2 hours. This is consistent with the NQA-1 standard as shown below.
	4.4.1 Single Storage Facility.	
N45.2.9 § 5.6 - Where a single record storage facility is maintained, at least the following features should be	Design and construction of a single record storage facility shall meet the criteria of (a) through (i) below:	Similar requirement.

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considered in its construction:		
N45.2.9 § 5.6 - 1. Reinforced concrete, concrete block, masonry, or equal construction.	(a) reinforced concrete, concrete block, masonry, or equal construction;	Similar requirement.
N45.2.9 § 5.6 - 2. Concrete floor and roof with sufficient slope, for drainage; if a floor drain is provided, a check valve (or equal) shall be included.	(b) floor and roof with drainage control; if a floor drain is provided, a check valve (or equal) shall be included	Similar requirement.
<p>N45.2.9 § 5.6 - 3. Structure, doors, frames and hardware should be Class A fire-rated with a recommended four hour minimum rating.</p> <p>Alternative from current MPS QAP Topical Report - Regulatory Guide 1.88— <i>Collection, Storage and Maintenance of Nuclear Power Plant Quality Assurance Records</i> - (Rev. 2, 10/76) -Endorses ANSI N45.2.9-1974 <u>ANSI N45.2.9</u>, states in part, "structure, doors, frames, and hardware should be Class A fire-related with a recommended four-hour minimum rating." The three record storage vaults onsite have a two-hour rating. The licensee's vaults are used for storage of documentation that is unsuitable for filming or awaiting filming. A records organization exists along with written procedures addressing the control of quality assurance records.</p> <p>Alternative from current VA QA Topical Report - (5) With regard to Section 5.6 of ANSI N45.2.9-1974, titled Facility: Paragraph 4, subsection 3 is clarified to require a two-hour minimum fire rating to be consistent with the 1979 version of the Standard and <i>NRC Criteria for Record Storage Facilities</i> (Guidance - ANSI N45.2.9, Section 5.6) issued 7/15/79.</p> <p>Alternatives from current VA QA Topical Report regarding fire rating of existing facilities.</p> <p>(6) The Surry Power Station facility conforms to ANSI N45.2.9-1974 as clarified in this Table except that it is rated at approximately 2 hours; doors, frames, and hardware are three-hour rated. This facility is considered to meet the intent of ANSI N45.2.9 and provides adequate protection for records.</p> <p>(7) The North Anna Power Station Records Vault meets the intent of Chapter 3 of NFPA No. 232-1975, subject to the following provisions:</p> <p>(a) The file room is constructed with a minimum fire rating of</p>	(c) doors, structure and frames, and hardware shall be designed to comply with the requirements of a minimum 2 hr fire rating;	Requirement revised to a 2-hour fire rating rather than 4 hours. The alternatives are no longer necessary since the current Company facilities all meet the two hour fire rating.

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<p>two (2) hours.</p> <p>(b)Heating, cooling and ventilation for the file room is by means of a forced air system, with all fans, filters, and heating and cooling elements located in an equipment room which is external to the file room. Ducts for this system are located on the ceiling of the file room and are provided with the standard door dampers with a minimum rating of two (2) hours where they penetrate the file room barrier to other areas of the building.</p> <p>(c)The file room is provided with an early warning fire detection system and automatic fire suppression system. A protective signaling system is provided, with a remote alarm located at a constantly attended station.</p> <p>(d)Telephone service is provided to the file room, with the wire penetration constructed and sealed in accordance with NFPA No. 232-1975.</p> <p>(e)All records stored in the file room are stored in metal cabinets or rolling file shelves, which are arranged to provide adequate access and aisleways. Work not directly related to the storage, retrieval or auditing of records is not allowed in the file room. Smoking, eating, and drinking is prohibited in the file room.</p> <p>(f) A wall divides the file room into two sections, with one section used as a file room and the other section used for microfilming of records and/or supply storage. The dividing wall has a minimum fire rating of two (2) hours, including the fire door dampers in the duct penetrating the wall.</p> <p>(8) The North Anna Power Station Training Center Vault meets the intent of Chapter 3 of NFPA No. 232-1975, subject to the following provisions:</p> <p>(a)The file room is constructed with a minimum fire rating of two (2) hours.</p> <p>(b)Heating, cooling and ventilation for the file room is by means of a forced air system, with all fans, filters, and heating and cooling elements located in an equipment room which is external to the file room. Ducts for this system are located above the ceiling of the file room and are provided with accordion dampers with a minimum rating of two (2) hours where they penetrate the file room barrier to other areas of the building.</p> <p>(c)The file room is provided with an early warning fire</p>		

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<p>detection system and automatic fire suppression system. A protective signaling system is provided, with a remote alarm located at a constantly attended station.</p> <p>(d)Telephone service is provided to the file room, with the wire penetration constructed and sealed in accordance with NFPA No. 232-1975.</p> <p>(e)All records stored in the file room are stored in metal cabinets, which are arranged to provide adequate access and aisleways. Work not directly related to the storage, retrieval or auditing of records is not allowed in the file room. Smoking, eating, and drinking is prohibited in the file room.</p> <p>(9) The Innsbrook Technical Center’s Vital Records Vaults for nuclear records conform to the requirements of Section 5.6 of ANSI N45.2.9-1974 as clarified in (5) above without exceptions.</p> <p>(10) The Surry Training Center training records vault (Main Building) conforms to the requirements of section 5.6 ANSI N45.2.9-1974 without exceptions.</p> <p>(11)Quality Assurance records may be stored in an approved offsite facility. The offsite facility must meet or exceed requirements of an onsite facility</p>		
N45.2.9 § 5.6 - 4. Sealant applied over walls as a moisture or condensation barrier.	(d) sealant applied over walls as a moisture or condensation barrier;	Similar requirement.
N45.2.9 § 5.6 - 5. Surface sealant on floor providing a hard-wear surface to minimize concrete dusting.	(e) surface sealant on floor providing a hard wear surface to minimize concrete dusting;	Similar requirement.
N45.2.9 § 5.6 - 6. Foundation sealant and provision for drainage.	(f) foundation sealant and provisions for drainage;	Similar requirement.
N45.2.9 § 5.6 - 7. Forced-air circulation with filter system.	(g) forced air circulation with filter system;	Similar requirement.
N45.2.9 § 5.6 - 8. Adequate fire protection system.	(h) fire protection system;	Similar requirement.
N45.2.9 § 5.6 - 9. No pipes other than those providing fire protection to the storage facility are to be located within the facility. Alternative from current VA QA Topical Report - (5) With regard to Section 5.6 of ANSI N45.2.9-1974, titled Facility : Paragraph 4, subsection 9 is clarified to read: “No pipes or penetrations except those providing fire protection, lighting, temperature/humidity control, or communications are to be located within the facility and they shall comply with a minimum two-hour fire protection rating.	(i) only those penetrations used exclusively for fire protection, communication, lighting, or temperature/humidity control are allowed; all such penetrations shall be sealed or dampered to comply with the minimum 2 hr fire protection rating.	NQA-1 clarifies the construction of the facility to allow other penetrations. This is in line with the VA alternative and eliminates the need for this alternative.
	The construction details shall be reviewed for adequacy of	New requirement for review of the

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	protection of contents by a person who is competent in the technical field of fire protection and fire extinguishing.	facility design.
	If the storage facility is located within a building or structure, the environment and construction of that building can provide a portion or all of these criteria.	New allowance when within another facility.
<p>NRC Reg. Guide 1.88, Regulatory Position C. 2. Two methods for protection of quality assurance records from the hazards of fire are described in Subdivision 5.6 of ANSI N45.2.9-1974. NFPA No. 232-1975, "Standard for the Protection of Records,"(2) also contains provisions for records protection equipment and records handling techniques that provide protection from the hazards of fire. This standard, within its scope of coverage, is considered by the NRC staff to provide an acceptable alternative to the fire protection provisions listed in Subdivision 5.6 of N45.2.9-1974. When NFPA No. 232-1975 is used, quality assurance records should be classified as NFPA Class 1 records (NFPA No. 232-1975, Chapter 5, Section 5222).</p>	<p>4.4.2 Alternate Single Storage Facility.</p> <p>The following are acceptable alternatives to the criteria of para. 4.4.1 above for a single storage facility:</p> <p>(a) 2 hr fire rated vault meeting NFPA 232-1986 or NFPA 232AM-1986 or both;¹</p> <p>(b) 2 hr fire rated Class B file containers meeting the requirements of NFPA 232-1986 or NFPA 232AM-1986 or both;¹ or</p> <p>(c) 2 hr fire rated file room meeting the requirements of NFPA 232-1986 or NFPA 232AM-1986 or both¹ with the following additional provisions:</p> <p>(1) early warning fire detection and automatic fire suppression capability with electronic supervision at a constantly attended central station;</p> <p>(2) records storage in fully enclosed metal cabinets;</p> <p>(3) adequate access and aisle ways;</p> <p>(4) prohibition in the room of work not directly associated with record storage or retrieval;</p> <p>(5) prohibition in the room of smoking, eating, or drinking;</p> <p>(6) 2 hr fire rated dampers or doors in all boundary penetrations.</p>	<p>This alternative is similar to NRC Reg. Guide 1.88, Regulatory Position C.2.</p>
	4.4.3 Temporary Storage.	
	<p>When temporary storage of records (such as for processing, review, or use) is required by an organization's procedures, the records shall be stored in a 1 hr fire rated container.</p> <p>The procedures shall specify the maximum allowable time limit for temporary storage.</p> <p>The container shall bear a UL label (or equivalent) certifying 1 hr fire protection or be certified by a person competent in the technical field of fire protection.</p>	<p>NQA-1 1994 Added flexibility to allow temporary storage when archiving immediately is not practical.</p>
	4.4.4 Dual Storage Facilities.	
<p>N45.2.9 § 5.6 - A satisfactory alternative to the</p>	<p>If dual storage facilities for each record are provided, the</p>	<p>Similar requirement.</p>

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establishing of a record storage facility is maintenance of duplicate records stored in a separate remote location.	storage facilities shall be at locations sufficiently remote from each other to eliminate the chance of exposure to a simultaneous hazard.	
	Each storage facility is not required to satisfy the requirements of para. 4.4.1, para. 4.4.2 or para. 4.4.3 above, but shall meet the other requirements of this Part (Part I).	Clarification to the above requirement that is consistent with the requirement of N45.2.9 § 5.6 for duplicate storage.
	5 RETRIEVAL	
N45.2.9 § 6. RETRIEVAL 6.1 General This section is intended to establish requirements for the retrieval of documents that are stored within the quality assurance record files. 6.2 Accessibility Storage systems shall provide for the accurate retrieval of information without undue delay.	Storage systems shall provide for retrieval of information in accordance with planned retrieval times based upon the record type.	Similar requirement.
N45.2.9 § 6.2 - A list shall be generated designating those personnel who shall have access to the files.	A list shall be maintained designating those personnel who shall have access to the files.	Similar requirement.
N45.2.9 § 6.2 - Quality Assurance records maintained by a manufacturer at his facility or other location shall be accessible to the Buyer or Owner, in the case of lifetime records for the life of the items involved or for the designated retention periods for nonpermanent records.	Records maintained by a Supplier at his facility or other location shall be accessible to the Purchaser or his designated alternate, e.g., the Owner.	Similar requirement.
	6 DISPOSITION	
N45.2.9 § 7. DISPOSITION 7.1 General This section is intended to provide requirements for the transfer of quality assurance records to the Owner, who has ultimate responsibility for these documents, and their disposition. 7.2 Accumulation and Transfer of Records. Quality assurance records accumulated at various locations prior to final transfer to the Owner shall be made accessible to the Owner directly, or through the procuring organization. Examples of such records are vendor manufacturing records, construction documentation, and startup data. Upon final transfer, the Owner shall inventory the submittals, acknowledge receipt and process these	Records accumulated at various locations, prior to transfer, shall be made accessible to the Owner directly or through the procuring organization. The custodian shall inventory the submittals, acknowledge receipt, and process these records in accordance with this Part (Part I).	Similar requirement.

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records in accordance with this Standard.		
N45.2.9 § 7.3 Disposition of Nonpermanent Records Records classified as nonpermanent should be retained for at least the minimum period of time as recommended in Appendix A. After this time, these records may be disposed of by or with concurrence of the Owner.	Various regulatory agencies have requirements concerning records that are within the scope of this Part (Part I). The most stringent requirements shall be used in determining the final disposition.	Similar requirement.
	The Supplier's nonpermanent records shall not be disposed of until the applicable conditions listed in (a) through (e) below are satisfied: (a) items are released for shipment, a Code Data Report is signed, or a Code Symbol Stamp is affixed; (b) regulatory requirements are satisfied; (c) operational status permits; (d) warranty consideration is satisfied; (e) Purchaser's requirements are satisfied.	NQA-1 provides additional detail on disposition of nonpermanent records from a supplier. N45.2.9 § 4.2 only addresses controlling timely turnover of records.
N45.2.9 § 1.2 Applicability The requirements of this standard apply to the work of any individual or organization that participates in collection, storage, or maintenance of quality assurance records associated with nuclear power plants. The extent to which the individual or total 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, and shall be specified in the procurement documents. The requirements are intended to assure that records are available when needed for their intended purpose. The ASME Boiler and Pressure Vessel Code (Here-after referred to as the Code) as well as other ANSI 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 1 and 2 and Section XI of the Code for those activities covered by the Code. This standard is intended to be used in conjunction with ANSI N45.2.		NQA-1 addresses applicability in the Introduction to Part I.
N45.2.9 § 1.4 Definitions	Definition from Introduction to Part I – quality assurance	Similar requirement.

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<p>The following definition is provided to assure a uniform understanding of select terms as they are used in this standard.</p> <p><i>Quality Assurance Records</i> - Those records which furnish documented evidence of the quality of items and of activities affecting quality. For the purposes of this standard a document is considered a quality assurance record when the document has been completed.</p> <p>Other terms and their definitions are contained in ANSI N45.2.10.</p> <p>Alternative from current MPS QAP Topical Report - <u>ANSI N45.2.9-1974</u>, paragraph 1.4, definition of "Quality Assurance Records" states in part: "For the purposes of this standard, a document is considered a quality assurance record when the document has been completed." The licensee has developed the following alternative definition to provide guidance during the interim period from the time a document is completed until it is transmitted to the licensee records retention facilities: "A record is considered a working document until it is transmitted to the licensee records retention facilities at which time it is designated as a Quality Assurance Record. The following maximum time limits are established for the transmittal of working documents to the licensee records retention facilities:</p> <ul style="list-style-type: none"> • <u>Operations Documents</u> - Documentation generated during plant operations may be maintained, as needed, by operating plant departments, for up to one year. • <u>New Construction or Betterment Documents</u> - Documents which evolve during new construction or betterment projects shall be transmitted to licensee records retention facilities within 90 days of completion of a new construction project or turnover of a betterment project or plant operations. • <u>Procurement Documents</u> - Inspection/Surveillance/Audit Reports generated during vendor oversight activities which are used to maintain vendor status for current and future procurements may be maintained, as needed, by Document Administration for up to three years. 	<p>record – a completed document that furnishes evidence of the quality of items and/or activities affecting quality</p>	<p>NQA-1 contains definitions in the Introduction to Part I, § 4.</p> <p>The alternatives from the current QA programs are no longer needed.</p> <p>With regard to the time frame (in the MPS definition) for sending a completed document to the storage facility, NQA-1 allows the organization to establish a program to address this as long as interim measures are established to protect the document.</p> <p>This is a level of detail that should be contained in the administrative controls. Reference 4.4.3 of NQA-1, Supplement 17S-1.</p> <p>With regard to the VA definition, the added detail on when a document becomes a record and the disposal of records upon completion of the time frame for storage is no longer necessary with the NQA-1 standard. Reference § 2.3 and § 6 of NQA-1, Supplement 17S-1.</p>

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<ul style="list-style-type: none"> • <u>All Other Working Documents</u> - All other working documents shall be transmitted to licensee records retention facilities within 6 months of their receipt or completion." The requirements of ANSI N45.2.9-1974 do not apply to these "working documents" based on paragraph 1.1 of the ANSI standard which states: "It (ANSI N45.2.9) is not intended to cover the preparation of the records nor to include working documents not yet designated as Quality Assurance Records." Alternative from the current VA QA Topical Report - (14) With regard to Section 1.4 of ANSI N45.2.9-1974 entitled, <i>Definitions</i>. The definition of "Quality Assurance Records" is revised to the following: "Those records which furnish documentary evidence of the quality of items and activities affecting quality or compliance with the NRC regulations. Documents are considered to be quality records when the document has been completed, including all required signatures, reviews, and approvals. At the expiration of a QA record period, the document is declassified and may be disposed of, if appropriate, as determined by Company management." 		
<p>N45.2.9 § 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 8 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 8 of this standard. Reg. Guide 1.88, Regulatory Position C.1. Subdivision 1.5 of ANSI N45.2.9-1974 states, "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 8 of this standard." The specific applicability or acceptability of these listed documents has been or will be covered separately in other regulatory guides or in Commission regulations where appropriate.</p>		The QAPD addresses other documents referenced in the standards.
<p>N45.2.9 § 8. REVISIONS OF REFERENCED ANSI STANDARDS</p>		The QAPD addresses what revision of a standard is to be used in implementing the QA program.

CRITERION 17 ANSI 45.2-77/ANSI N18.7-76/ANSI N45.2.9	BASIC REQUIREMENT 17 NQA-1 1994	COMMENTS
<p>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.</p> <p>Revisions to 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.</p> <p>N45.2 Quality Assurance Program Requirements for Nuclear Power Plants</p> <p>N45.2.10 Quality Assurance Terms and Definitions</p>		
<p>N45.2.9 § 5.7 Audits</p> <p>An audit system shall be established to assure that the quality assurance records storage system is effective. The following shall be performed as a minimum:</p> <ol style="list-style-type: none"> 1 Periodic surveys to assure that records logged in are available and have been placed in their proper location within the files, and to assure that the control system is adequate. 2. Periodic audits to assure that the facilities are in good condition and that the temperature/humidity controls and protective devices are functioning properly. 3. Periodic audits of the records to assure that the documents are not deteriorating due to improper storage practices or rough handling. 		<p>NQA-1 addresses audits under Basic Requirement 18 and Supplement 18S-1.</p>

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APPENDIX A

The following is a list of types of records with the recommended minimum retention periods indicated (see paragraph 3.2.7). For definition of lifetime records see paragraph 2.2.1, and for nonpermanent records see paragraph 2.2.2. In the nonpermanent column the number indicates the retention period in years after which the record need not be maintained. The 0 years minimum recommended retention period is intended to permit dispositioning of the records on the day following the date of commercial operation. One year retention is intended to require maintenance of the record for the customary periods of warranty. Two year retention is intended to require maintenance of the record through the first Overhaul or reload. Five and six year retention is intended to achieve compliance with regulatory requirements.

Record Types	Lifetime	Nonpermanent
A.1 Design Records		
Applicable Codes and Standards Used in Design	X	
As-Constructed Drawings	X	
Design Calculations and Record of Checks	X	
Design Change Requests		1
Design Deviations	X	
Design Procedures and Manuals		2
Design Reports	X	
Design Review Reports		1
Drawing Control Procedures		2
Purchase and Design Specifications and Amendments	X	
QA System Audit Reports		6
Reports of Engineering Surveillance of Field Activity		1
Safety Analysis Report	X	
Stress Reports	X	
Systems Descriptions	X	
Systems Process and Instrumentation Diagrams	X	
Technical Analysis, Evaluations, and Reports	X	
A.2 Procurement Records		
Audit Reports		6
Procurement Procedures		0
Procurement Specification	X	
Purchaser Order (Unpriced) Including Amendments		2
Purchaser's Pre-Award Quality Assurance Survey		2
Receiving Records		0
Supplier's Quality Assurance Program Manual		2
A.3 Manufacturing Records		
Applicable Code Data Reports	X	
As-Built Drawings and Records	X	
Certificate of Inspection and Test Personnel Qualification		0
Certificates of Compliance	X	
Cleaning Procedures		0
Eddy-Current Examination Procedure		2
Eddy-Current Examination Final Results	X	
Electrical Control Verification Test Results		2
Ferrite Test Procedure		2
Ferrite Test Results	X	
Forming and Bending Procedure Qualifications		0
Heat Treatment Procedures		0
Heat Treatment Records	X	
Hot Bending Procedure		0
Inspection and Test Instrumentation and Tooling Calibration Procedures and Records		(Until Recalibrated)

Record Types	Lifetime	Nonpermanent
Liquid Penetrant Examination Procedure		2
liquid Penetrant Examination Final Results	X	
Location of Weld Filler Material	X	
Magnetic Particle Examination Procedure		2
Magnetic Particle Examination Final Results	X	
Major Defect Repair Records	X	
Material Properties Records	X	
Nonconformance Reports	X	
Packaging, Receiving, Storage Procedures		0
Performance Test Procedure and Results Records	X	
Pipe and Fitting Location Report	X	
Pressure Test Procedure		2
Pressure Test Results	X	
Product Equipment Calibration Procedure		(Until Recalibrated)
Product Equipment Calibration Records		(Until Recalibrated)
QA System Audit Report		6
QA Manuals, Procedures and Instructions		2
Radiographic Procedures		2
Radiographic Review Forms and Radiographs	X	
Ultrasonic Examination Procedures		2
Ultrasonic Examination Final Results	X	
Welding Materials Control Procedures		2
Welding Personnel Qualification		2
Welding Procedure Qualifications and Data Reports		2
Welding Procedures	X	
Work Processing and Sequencing Documents		2
A.4 Installation-Construction Records		
A.4.1 Receiving and Storage		
Inspection Reports for Stored Items		0
Nonconformance Reports	X	
Receipt Inspection Reports on Items		1
Receiving, Storage, and Inspection Procedures		2
Storage Inventory and Issuance Records		0
Vendor Quality Assurance Releases		0
A.4.2 Civil		
Aggregate Test Reports		1
Batch Plant Operation Reports		1
Cement Grab Sample Reports		0
Check-Off Sheets for Tendon Installation	X	
Concrete Cylinder Test Reports and Charts	X	
Concrete Design Mix Reports	X	
Concrete Placement Records	X	
Inspection Reports for Channel Pressure Tests	X	
Material Property Reports on Containment Liner and Accessories	X	
Material Property Reports on Metal Containment Shell and Accessories	X	
Material Property Reports on Reinforcing Steel	X	
Material Property Reports on Reinforcing Steel Splice Sleeve Material	X	
Material Property Reports on Steel Embedments in Concrete	X	
Material Property Reports on Steel Piling		1
Material Property Reports on Structural Steel and Bolting	X	
Material Property Reports on Tendon Fabrication Material	X	
Mix Water Chemical Analysis		1

Record Types	Lifetime	Nonpermanent
Pile Drive Log	X	
Pile Loading Test Reports	X	
Procedure for Containment Vessel Pressure-Proof Test and Leak Rate Tests and Results	X	
Reinforcing Steel Splice Operator Qualification Reports		0
Releases to Plate Concrete		0
Reports for Periodic Tendon Inspection	X	
Reports of High-Strength Bolt Torque Testing		1
Slump Test Results		0
Soil Compaction Test Reports	X	
User's Tensile Test Reports on Reinforcing Steel		1
User's Tensile Test Reports on Reinforcing Steel Splices		1
A.4.3 Welding		
Ferrite Test Procedures		2
Ferrite Test Results	X	
Heat Treatment Procedures		0
Heat Treatment Records	X	
Liquid Penetrant Test Procedures		2
Liquid Penetrant Test Final Results	X	
Magnetic Particle Test Procedures		2
Magnetic Particle Test Final Results	X	
Major Weld Repair Procedures and Results	X	
Radiographic Test Procedures		2
Radiographic Test Final Results	X	
Ultrasonic Test Procedures		2
Ultrasonic Test Final Results	X	
Weld Fit-Up Reports		1
Weld Location Diagrams		2
Weld Procedures	X	
Weld Procedures Qualifications and Results		2
Welding Filler Metal Material Reports	X	
Welding Materials Control Procedures		2
Welding Personnel Qualifications		2
A.4.4 Mechanical		
Chemical Composition User's Test (Grab Samples) for Thermal Insulation		1
Chemical Tests of Water Used for Mixing Insulation Cement		1
Cleaning Procedures and Results		1
Code Data Reports	X	
Construction Lifting and Handling Equipment Test Procedures, Inspection and Test Data		0
Data Sheets or Logs on Equipment Installation, Inspection and Alignment		2
Documentation of Systems Check-Off (Logs or Data Sheets)		1
Erection Procedures for Mechanical Components		1
Hydro-Test Procedures and Results	X	
Installed Lifting and Handling Equipment Procedures, Inspection and Test Data	X	
Lubrication Procedures	X	
Lubrication Records	X	
Material Property Records	X	
Material Property Test Reports for Thermal Insulation	X	
Pipe and Fitting Location Reports	X	
Pipe and Fittings Material Property Reports	X	
Pipe Hanger and Restraint Data	X	

Record Types	Lifetime	Nonpermanent
Safety Valve Response Test Procedures	X	
Safety Valve Response Test Results		6
A.4.5 Electrical and I&C		
Cable Pulling Procedures		0
Cable Separation Check Lists		1
Cable Splicing Procedures	X	
Cable Terminating Procedures	X	
Certified Cable Test Reports	X	
Documentation of Testing Performed After Installation and Prior to Systems Conditional Acceptance		2
Field Workmanship Checklist or Equivalent Logs		1
Instrument Calibration Results		(Until Recalibrated)
Relay Test Procedures and Results	X	
Reports of Preinstallation Tests		2
Voltage Breakdown Tests on Liquid Insulation	X	
A.4.6 General		
"As-Built" Drawings and Records	X	
Calibration of Measuring and Test Equipment and Instruments Procedures and Reports		(Until Recalibrated)
Certificate of Inspection and Test Personnel Qualification		1
Field Audit Reports		6
Field Quality Assurance Manuals		2
Final Inspection Reports and Releases	X	
Nonconformance Reports	X	
Special Tool Calibration Records		(Until Recalibrated)
Specifications and Drawings	X	
A.5 Preoperational and Startup Test Records		
Automatic Emergency Power Source Transfer Procedures and Results	X	
Final Systems Adjustment Data	X	
Flushing Procedures and Results		2
Hydrostatic Pressure Test Procedures and Results	X	
Initial Heatup, Hot Functional and Cooldown Procedures and Results	X	
Initial Plant Loading Data	X	
Initial Reactor Criticality Test Procedures and Results	X	
Instrument AC Systems and Inverters Test Procedures and Reports	X	
Main and Auxiliary Power Transformer Test Procedures and Results	X	
Off-Site Power-Source Energizing Procedures and Test Reports	X	
On-Site Emergency Power Source Energizing Procedure and Test Reports	X	
Plant Load Ramp Change Data	X	
Plant Load Step Change Data	X	
Power Transmission Substation Test Procedures and Results	X	
Preoperational Test Procedures and Results	X	
Primary and Secondary Auxiliary Power Test Procedures and Results	X	
Reactor Protection System Tests and Results	X	
Startup Logs	X	
Startup Problems and Resolutions		6
Startup Test Procedures and Results	X	
Station Battery and DC Power Distribution Test Procedures and Reports	X	
System Lubricating Oil Flushing Procedures		2
Water Chemistry Reports	X	
A.6 Operation Phase Activity Records		
A.6.1 Operation, Maintenance and Testing		

Record Types	Lifetime	Nonpermanent
Records and Drawing Changes Reflecting Plant Design Modifications Made to Systems and Equipment Described in the Final Safety Analysis Report	X	
New and Spent Fuel Inventory, Transfers of Fuel, and Assembly Histories	X	
Plant Radiation and Contamination Survey Records	X	
Off-Site Environmental Monitoring Survey Records	X	
Radiation Exposure Records of All Plant Personnel, and Others who Enter Radiation Control Areas	X	
Radioactivity Levels of Liquid and Gaseous Waste Released to Environment	X	
Transient or Operational Cycling Records for Those Plant Components That Have Been Designed to Operate Safely for a limited Number of Transients or Operational Cycles	X	
Current Individual Plant Staff Member Qualifications, Experience, Training and Retraining Records	X	
Reactor Coolant System In-Service Inspection Records	X	
Minutes of Meetings of the Plant Nuclear Safety Committee and Company Nuclear Review Board	X	
Normal Nuclear Unit Operation, Including Power Levels and Periods of Operation at Each Power Level		5
Principal Maintenance Activities, Including Inspection Repair, Substitution or Replacement of Principal Items of Equipment Pertaining to Nuclear Safety		5
Abnormal Occurrence Records		5
Periodic Checks, Inspections and Calibrations Performed to Verify that Surveillance Requirements are Being Met		5
Special Reactor Test or Experiment Records		5
Changes Made in the Operating Procedures		5
Radioactive Shipment Records		5

Alternative table of records retention requirements from current VA QA Topical Report related to Appendix A of ANSI N45.2.9-1974

Table 17.2-2 RECORDS RETENTION REQUIREMENTS	
Description of Records (Operational Phase Activities)	Retention Period
Records and drawing changes reflecting plant design modifications made to systems and equipment described in the final safety analysis report	Lifetime a (1)
Records of new and spent fuel inventory, transfers of fuel, and assemblies histories	Lifetime a (1) plus 3 years
Records of plant radiation and contamination surveys	Lifetime a (1)
Records of off-site environmental monitoring surveys	Lifetime a (1)
Records of radiation exposure of all plant personnel, and others who enter radiation control areas	Lifetime a (1)
Records of radioactive levels of liquid and gaseous waste released to the environment	Lifetime a (1)
Records of transient or operational cycles for those plant components that have been designated to operate safely for a limited number of transients or operational cycles	Lifetime a (4)
Records of inservice inspections	Lifetime a (4)
Records of meetings of the Station Nuclear Safety and Operating Committee and the Management Safety Review Committee	Lifetime a (1)
Records of the service lives of all hydraulic and mechanical snubbers on safety-related systems, including the date at which the service life commences and associated installation and maintenance records	Lifetime a (4)
Records of secondary water sampling and water quality	Lifetime a (1)
Records of Environmental Qualification in accordance with 10 CFR 50.49	Lifetime a (1)
Records of reviews performed for changes made to the offsite dose calculation manual and the process control program	Lifetime a (1)

Table 17.2-2
RECORDS RETENTION REQUIREMENTS

Description of Records (Operational Phase Activities)	Retention Period
Records of normal plant operation, including power levels and periods of operation at each power level	5 years
Records of principal maintenance activities, including inspection, repair, substitution or replacement of principal items of equipment related to nuclear safety	5 years
Reportable events reports	5 years
Records of periodic checks, inspections, and calibrations performed to verify that surveillance requirements are being met	5 years
Records of special reactor tests or experiments	5 years
Records of changes made in procedures pursuant to 10 CFR 50.59	5 years
Records of Audits Performed to 10 CFR 50, Appendix B, Quality Assurance Program	5 years
Records of radioactive material shipments	3 years
Records of sealed source leak test results and physical inventories of sealed sources material	5 years
Records of current individual plant staff members qualifications, experience, training and retraining	Lifetime or as noted below
• Radiological protection training records (e.g., Nuclear Employee Training, Advanced Radiation Worker, Radiation Protection Technician, etc.)	Lifetime a (1)
• Initial training and qualification records	Lifetime a (2)
• Requalification records (excepted licensed individuals)	3 cycles
• Requalification records for licensed individuals	6 years after license renewal
• Training materials - Revision 0 records	Lifetime a (1)
-- Plant Staff training materials - Superseded Revisions	3 cycles
-- Licensed Operators training materials - Superseded Revisions	6 years
-- Radiation Protection training materials - Superseded Revisions	Lifetime a (1)
• Retraining, specialized training, continuing training records (except licensed individual and Radiological Protection technicians)	3 cycles
• Contractor training (except Nuclear Employee Training, Advanced Radiation Worker, Radiation Protection Technician training and retraining etc.)	3 cycles
• INPO Accreditation records	Initial accreditations - Lifetime a (1) and superseded material - 4 years
• Simulator facility records (e.g., certification and basis documents, NRC Form-474, performance test, fidelity reports, maintenance and modifications, and basis documents, etc.)	Initial accreditation records - Lifetime a (1) and superseded material - 4 years after submittal of NRC Form-474
a. Lifetime - is (1) until the termination of the Facility Operating License, (2) until termination of employment (training and qualification records); (3) transfer of ownership (i.e., fuel); or (4) service life of the facility, system, or component, as applicable.	

NRC Reg. Guide 1.28 - Rev. 3, Regulatory Position C.2

TABLE 1

Retention Times for Lifetime and Nonpermanent Records

Record Type	Lifetime	Nonpermanent*	
		3 yr.	10 yr.
1. Design Records			
Applicable codes and standards used in design	X		
Design drawings	X		
Design calculations and, record of checks	X		
Approved design change requests	X		
Design deviations and nonconformances	X		
Design reports	X		
Design verification data	X		
Design specifications and amendments	X		
Safety analysis report	X		
Certified stress reports for code items	X		
System descriptions	X		
System process and instrumentation diagrams	X		
Technical analysis, evaluations, and reports	X		
Master change record	X		
Reliability analysis, evaluation, and reports	X		
Equipment qualification documentation	X		
Design review reports			X
Design procedures and manuals		X	
Design control procedures		X	
Reports of engineering surveillance of field activity		X	
2. Procurement Records			
Procurement specification	X		
Purchase order (unpriced) including amendments	X		
Procurement procedures		X	
Purchaser's pre-award quality assurance survey		X	
Receiving records		X	
Supplier's quality assurance program manual		X	
Source surveillance data plans, audit and surveillance reports		X	
3. Manufacturing Records			
Applicable code data reports	X		
As-built drawings and records	X		
Certificate of compliance	X		
Eddy-current examination final results	X		
Electrical control verification test results	X		
Ferrite test results	X		
Heat treatment records	X		
Liquid penetrant examination final results	X		
Location of weld filler material	X		
Magnetic particle examination final results	X		
Major defect repair records	X		
Material properties records	X		
Nonconformance reports	X		
Performance test procedure and results records	X		
Pipe and fitting location report	X		
Pressure test results (hydrostatic or pneumatic)	X		
Radiograph review records	X		

Record Type	Lifetime	Nonpermanent*	
		3 yr.	10 yr.
Ultrasonic examination final results	X		
Welding procedures	X		
Radiographs not required by ASME Section XI			X
Certificate of inspection and test personnel qualification		X	
Cleaning procedures		X	
Eddy-current examination procedure		X	
Ferrite test procedure		X	
Forming and bending procedure qualifications		X	
Heat treatment procedures		X	
Hot bending procedure		X	
Inspection and test instrumentation and tooling calibration records (after last calibration)		X	
Liquid penetrant examination procedure		X	
Magnetic particle examination procedure		X	
Packaging, receiving, storage procedures		X	
Product equipment calibration procedure		X	
QA manuals, procedures, and instructions		X	
Radiographic procedures		X	
Ultrasonic examination procedures		X	
Welding materials control procedures		X	
Welding procedure qualifications and data reports		X	
Work processing and sequencing documents		X	
Product equipment calibration records (after last calibration)		X	
Installation Construction Records			
4.1 Receiving and Storage			
Nonconformance reports	X		
Inspection reports for stored items		X	
Receipt inspection reports on items		X	
Receiving, storage, and inspection procedures		X	
Storage inventory and issuance records		X	
Vendor quality assurance releases		X	
4.2 Civil			
Checkoff sheets for tendon installation	X		
Concrete cylinder test reports and charts	X		
Concrete design mix reports	X		
Concrete placement records	X		
Inspection reports for channel pressure tests	X		
Material property reports on containment liner and accessories	X		
Material property reports on metal containment shell and accessories	X		
Material property reports on reinforcing steel	X		
Material property reports on reinforcing steel splice sleeve material	X		
Material property reports on steel embedments in concrete	X		
Material property reports on structural steel and bolting	X		
Material property reports on tendon fabrication material	X		
Pile drive log	X		
Pile loading test reports	X		
Procedure for containment vessel pressure proof test and leak-rate tests and results	X		
Reports for periodic tendon inspection	X		
Reports of high-strength bolt torque testing	X		
Soil compaction test reports	X		
Aggregate test reports			X

Record Type	Lifetime	Nonpermanent*	
		3 yr.	10 yr.
Batch plant operation reports			X
Cement grab sample reports			X
Material property reports on steel piling			X
Mix water chemical analysis			X
Releases to place concrete			X
Slump test results			X
User's tensile test reports on reinforcing steel			X
User's tensile test reports on reinforcing steel splices			X
4.3 Welding			
Ferrite test results	X		
Heat treatment records	X		
Liquid penetrant test final results	X		
Material property records	X		
Magnetic particle test final results	X		
Major weld repair procedure and results	X		
Radiograph review records and final results	X		
Ultrasonic test final results	X		
Weld location diagrams	X		
Weld procedures	X		
Welding filler metal material reports	X		
Ferrite test procedures		X	
Heat treatment procedures		X	
Liquid penetrant test procedures		X	
Magnetic particle test procedures		X	
Radiographic test procedures		X	
Ultrasonic test procedures		X	
Welding materials control procedures		X	
Welding personnel qualifications		X	
Weld fitup reports			X
Weld procedure qualifications and results			X
4.4 Mechanical			
Cleaning procedures and results	X		
Installed lifting and handling equipment procedures, inspection, and test data	X		
Lubrication procedures	X		
Material properties records	X		
Pipe and fitting location reports	X		
Pipe hanger and restraint data ...	X		
Safety valve response test procedures	X		
Code data reports	X		
Pressure test results (hydrostatic or pneumatic)		X	
Chemical composition user's test (grab samples) for thermal insulation			X
Chemical tests of water used for mixing insulation cement			X
Data sheets or logs on equipment installations inspection, and alignment			X
Documentation of system checkoffs (logs or data sheets)			X
Material property test reports for thermal insulation			X
Safety valve response test results			X
Cleaning procedures		X	
Construction lifting and handling equipment test procedures		X	
Erection procedures for mechanical components		X	
Hydrotest procedures		X	
4.5 Electrical and Instrumentation and Control			

Record Type	Lifetime	Nonpermanent*	
		3 yr.	10 yr.
Cable pulling tension data	X		
Cable separation data	X		
Cable terminating procedures	X		
Certified cable test reports	X		
Relay test procedures and test results	X		
Voltage breakdown test results on liquid insulation	X		
Cable pulling procedures		X	
Cable separation checklists		X	
Instrument calibration results (after last calibration)		X	
Documentation of testing performed after installation and prior to conditional acceptance of systems			X
Field workmanship checklist or equivalent logs			X
Reports of preinstallation tests			X
4.6 General			
As-built drawings and records	X		
Final inspection reports and releases	X		
Nonconformance reports	X		
Specifications and drawings	X		
Index system to record file	X		
Quality assurance and quality control manuals		X	
Fire protection reports	X		
Security plan procedures and activities	X		
Emergency plan, procedures, and activities	X		
Evaluation of results of reportable safety concerns as required by regulations	X		
Calibration reports for measuring and test equipment and instruments (after last calibration)		X	
Calibration procedures for measuring and test equipment and instruments		X	
Certificate of inspection and test personnel qualification		X	
Field audit reports		X	
Field quality assurance manuals		X	
Quality assurance system audit reports and related correspondence		X	
Special tool calibration records (after last calibration)		X	
5. Preoperational and Startup Test Records			
Final system adjustment data	X		
Initial plant loading data	X		
Plant load ramp change data	X		
Plant load step change data	X		
Preoperational test procedures and results	X		
Reactor protection system tests and results	X		
Startup test procedures and results	X		
Inservice inspection reports	X		
Records of reactor tests and experiments	X		
Records and logs of maintenance activities, inspections, repair, mid replacement of principal items of structures, systems, and components	X		
Automatic emergency power source transfer procedures and results			X
Initial heatup, hot functional, and cooldown procedures and results			X
Initial reactor criticality test procedures and results			X
Instrument AC system and inverter test procedures and reports			X
Main and auxiliary power transformer test procedures and results			X
Offsite power source energizing procedures and test reports			X
Onsite emergency power source energizing procedure and test reports			X

Record Type	Lifetime	Nonpermanent*	
		3 yr.	10 yr.
Primary and secondary auxiliary power test procedures and results			X
Startup logs			X
Station battery and DC power distribution test procedures and reports			X
Water chemistry report			X
Records of reviews performed for changes made to procedures or equipment or reviews of tests and experiments			X
Startup problems and resolutions			X
Flushing results			X
Power transmission substation test procedures and results		X	
Surveillance activities, inspections, and calibrations required by the technical specifications records		X	
System lubricating oil flushing procedures		X	
Flushing procedures		X	
Pressure test procedures		X	
Periodic checks, inspections, and calibrations performed to verify that surveillance requirements are being met		X	
* Table 1 is to be used in conjunction with Regulatory Position C.2, which states that nonpermanent records should be retained at least until the date of issuance of the full-power operating license of the unit.			

<p align="center">CRITERION 18 ANSI N45.2-77/N45.2.12-77 /ANSI N18.7-76</p>	<p align="center">BASIC REQUIREMENT 18 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>N45.2 § 19 / N18.7 § 4.5, unless noted otherwise.</p>		
<p>Reg. Guide 1.144, C. Regulatory Position – The requirements that are include in ANSI/ASME N45.2.12-1977 for auditing quality assurance programs for nuclear power plants are acceptable to the NRC staff and provide an adequate basis for complying with the pertinent quality assurance requirements of Appendix B to 10 CFR 50.</p>		<p>Reg. Guide 1.28 addresses the Regulatory Position on quality assurance audit requirements relative to NQA-1.</p>
<p>N45.2 ¶ 1 A comprehensive system of planned and documented audits shall be carried out to verify compliance with all aspects of the Quality Assurance Program. N18.7 A comprehensive system of planned and documented audits shall be carried out to verify compliance with all aspects of the administrative controls and quality assurance program. N45.2.12 § 3. AUDIT SYSTEM - 3.1 General - This section establishes requirements for a comprehensive audit system which shall be planned, documented, and implemented to verify compliance with the elements of a quality assurance program. ... N45.2.12 § 3.4 Audit Planning - The audit system, including both internal and external audits, shall be planned, documented, and conducted to assure coverage of the applicable quality assurance program, and overall coordination and scheduling of audit activities.</p>	<p>Planned and scheduled audits shall be performed to verify compliance with all aspects of the quality assurance program and to determine its effectiveness.</p>	<p>Similar requirements.</p>
<p>N45.2 ¶ 1 The audits shall be performed in accordance with written procedures or check lists by appropriately trained personnel not having direct responsibilities in the areas being audited. N18.7 ¶ 3 Those performing the audits may be members of the audited organization; however, they shall not audit activities for which they have immediate responsibility. While performing the audit, they shall not report to a management representative who has immediate responsibility for the activity being audited. N45.2.12 § 3. AUDIT SYSTEM - 3.1 General - ... The audit system shall be described in approved, written policies, plans, procedures, instructions, or such other documents as appropriate. N45.2.12 § 4. AUDIT IMPLEMENTATION - 4.1 General -</p>	<p>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.</p>	<p>Similar requirements. N18.7 is more prescriptive regarding use of line personnel to perform audits.</p>

CRITERION 18 ANSI N45.2-77/N45.2.12-77 /ANSI N18.7-76	BASIC REQUIREMENT 18 NQA-1 1994	COMMENTS
Individual audits shall be implemented as scheduled and planned in Section 3.		
N45.2 ¶ 1 Audit results shall be documented by auditing personnel and shall be reviewed by management having responsibility in the area audited. N18.7 ¶ 2 Written reports of such audits shall be reviewed by the independent review body and by appropriate members of management including those having responsibility in the area audited.	Audit results shall be documented and reported to and reviewed by responsible management.	Similar requirements. N18.7 adds requirement for review by independent review body. Independent review is addressed in the QAPD, Appendix B.
N45.2 ¶ 1 Responsible management shall take necessary action to correct the deficiencies revealed by the audit. N18.7 ¶ 3 Appropriate and timely followup action, ..., shall be taken.	Follow-up action shall be taken where indicated.	Similar requirements.
	SUPPLEMENT 18S-1 SUPPLEMENTARY REQUIREMENTS FOR AUDITS	ANSI N45.2.12-1977 provides much of the supplemental information for audits found in N45.2 and NQA-1.
	1 GENERAL	
N45.2.12 This standard provides requirements and guidance for establishing and implementing a system of internal and external audits of quality assurance programs for nuclear power plants, including the preparation, performance, reporting, and follow-up of audits by both the auditing and audited organizations.	This Supplement provides amplified requirements for quality assurance audits.	
N45.2.12 This standard amplifies the audit requirements of ANSI N45.2 and shall be used in conjunction with that standard.	It supplements the audit requirements of Basic Requirement 18 of this Part (Part I) and shall be used in conjunction with that Basic Requirement when and to the extent specified by the organization invoking this Part (Part I).	
N45.2.12 § 3.5 Scheduling	2 SCHEDULING	
N45.2 ¶ 6 Audits should be conducted periodically or on a random, unscheduled basis, or both. N45.2.12 § 3.5.1 Auditing shall be initiated as early in the life of the activity as practicable, consistent with the schedule for accomplishing the activity, to assure timely implementation of quality assurance requirements. In any case, auditing shall be initiated early enough to assure effective quality assurance during the design, procurement and contracting activities. N45.2.12 § 3.4 Audit Planning - The audit system, including	Internal or external quality assurance audits, or both, shall be scheduled in a manner to provide coverage and coordination with ongoing quality assurance program activities.	Similar requirement. NQA-1 uses the term schedule in place of the term plan used by the ANSI standards to address the overall audit plan (not to be confused with the individual audit plans). Reg. Guide 1.28 provides the Regulatory Position on Scheduling. This position affects several of the requirements of this section, but to

<p align="center">CRITERION 18 ANSI N45.2-77/N45.2.12-77 /ANSI N18.7-76</p>	<p align="center">BASIC REQUIREMENT 18 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>both internal and external audits, shall be planned, documented, and conducted to assure coverage of the applicable quality assurance program, and overall coordination and scheduling of audit activities. ...</p>		<p>prevent repeating the information, it is inserted in the next cell to align with the Regulatory Position from Reg. Guide 1.144.</p>
<p>N45.2.12 § 3.5.2 Audits shall be regularly scheduled on the basis of the status and importance of the activities to assure the adequacy of, and conformance with, the program.</p> <p>N18.7 ¶ 1 Audits of selected aspects of operational phase activities shall be performed with a frequency commensurate with their safety significance and in such a manner as to assure that an audit of all safety-related functions is completed within a period of two years.</p> <p>Alternative from current MPS QA Topical Report <u>ANSI N18.7-1976</u>, paragraph 4.5, states in part, ‘Audits of selected aspects of operational phase activities shall be performed with a frequency commensurate with their safety significance and in such a manner as to assure that an audit of all safety-related functions is completed within a period of two years.’</p> <p>The licensee has established a 90 day grace period applied to the 24 month frequency for internal audits. This grace period will not be applied to audits of the Emergency Preparedness Program which satisfy the requirements of 10CFR50.54(t) or to audits of the Security Plan which satisfy the requirements of 10CFR50.54(p)(3) 73.56(g)(1) and (g)(2), and 73.55(g)(4). The audit frequency of these audits are described in their respective plans. For activities deferred in accordance with the 90 day grace period, the next performance due date for such activities will be based on their original scheduled date, i.e., in all cases the periodicity for these activities will not be allowed to exceed the original commitment plus 90 days.”</p> <p>Alternative from the current VA QA Topical Report. (2) Paragraph C.4 (<i>Audit Program</i>) of Regulatory Guide 1.33 (and Section 4.5 of ANSI N18.7-1976 which it references) will be implemented as required by the applicable nuclear facility Technical Specifications, Emergency Plan, Security Plan, Fitness for Duty Program, and administrative controls which designate the minimum</p>	<p>Audits shall be scheduled at a frequency commensurate with the status and importance of the activity.</p> <p>NRC Reg. Guide 1.28, Regulatory Position 3. Audits: Section 2, “Scheduling,” of Supplement 18S-1, “Supplementary Requirements for Audits,” requires audits to be scheduled in a manner that provides coverage and coordination with ongoing quality assurance program activities. The following guidelines are considered acceptable for scheduling audits:</p> <p>3.1 Internal Audits Applicable elements of an organization’s quality assurance program should be audited at least once each year or at least once during the life of the activity, whichever is shorter. In determining the scope of the audit, an evaluation of the activity being audited may be useful. The evaluation may include results of previous quality assurance program audits and the results of audits from other sources, including the nature and frequency of identified deficiencies and any significant changes in personnel, organization, or quality assurance program.</p> <p>3.2 External Audits After the award of a contract, the applicant or licensee may determine, based on the evaluation conducted in accordance with Section 5.1 of Appendix 4A-1, that external audits are not necessary for procuring items that are (1) relatively simple and standard in design, manufacturing, and testing and (2) adaptable to standard or automated inspections or tests of the end product to verify quality characteristics after delivery.</p> <p>For other procurement actions not covered by the above exceptions, audits should be conducted as described below.</p> <p>1. The applicant or licensee should either audit its supplier’s quality assurance program on a triennial basis or arrange for such audit. In either case, the audit should be implemented in accordance with Supplement 18S-1 of ANSI/ASME</p>	<p>NQA-1 doesn’t establish a minimum frequency. Frequency commensurate with the Reg. Guides and previous alternatives is addressed in the text of the QAPD.</p> <p>The grace period for the frequencies is addressed through the Definitions of the QAPD.</p> <p>Necessary alternatives are addressed through the new QAPD, Appendix C. Additional information is contained in NQA-1 as nonmandatory guidance of Appendix 18A-1 § 2.3.</p> <p>Where the regulatory guide refers to NQA-1-1983, Dominion will use NQA-1-1994 as described in the QAPD.</p>

<p align="center">CRITERION 18 ANSI N45.2-77/N45.2.12-77 /ANSI N18.7-76</p>	<p align="center">BASIC REQUIREMENT 18 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>areas to be audited. The audit program is further defined and will be implemented as required by the commitment to ANSI N45.2.12 as stated in Table 17.2.0 of the Operational Quality Assurance Program. Paragraph C.4.c of Regulatory Guide 1.33 (and ANSI N18.7 to which it references) will be implemented as clarified in Section 17.2.18 of the Operational Quality Assurance Program Topical Report. Specifically, the frequency for conducting audits of the performance, training, and qualifications of the facility staff may vary based on performance and the safety significance of the audited activity but will not be less frequent than biennial (2 years).</p> <p>Reg. Guide 1.144, C.3. – Section 3.5.2 of ANSI/ASME N45.2.12-1977 requires that audits of quality assurance activities be regularly scheduled to ensure that the quality assurance program is adequate and that activities are being performed in accordance with the quality assurance program. The frequency of the scheduling of audits is dependent on the status and importance of the activities to be audited, and the following is considered acceptable scheduling:</p> <p>a. Internal Audits – (1) Operational Phase Activities-Regulatory Guide 1.33, “Quality Assurance Program Requirements (Operation),” should be followed. (2) Design and Construction Phase Activities-Applicable elements of an organization’s quality assurance program should be audited at least annually or at least once within the life of the activity, whichever is shorter.</p> <p>b. External Audits – (1) External audits, after the award of a contract, are not necessary for procurement actions when the items or services are all of the following: (a) Relatively simple and standard in design, manufacture, and test, and (b) Adaptable to standard or automated inspections or tests of the end product to verify quality characteristics after delivery, and (c) Such that receiving inspection does not require operations that could adversely affect the integrity, function, or cleanness of the item. (2) For other procurement actions not listed in Item C.3.b.(1), audits should be conducted as follows: Elements of a supplier’s quality assurance program should</p>	<p>NQA-1-1983. The triennial period begins when an audit is performed. An audit may be performed when the supplier has completed sufficient work to demonstrate that its organization is implementing a quality assurance program that has the required scope for purchases placed during the triennial period. If a subsequent contract or a contract modification significantly enlarges the scope of or changes the methods or controls for activities performed by the same supplier, an audit of the modified requirements should be conducted, thus starting a new triennial period. If the supplier is implementing the same quality assurance program for other customers that is proposed for use on the auditing party’s contract, the pre-award survey may serve as the first triennial audit if conducted in accordance with the requirements of ANSI/ASME NQA-1-1983. Therefore, when such pre-award surveys are employed as the first triennial audits, they should satisfy the same audit elements and criteria as those used on other triennial audits.</p> <p>2. The applicant or licensee should perform or arrange for annual evaluations of suppliers. This evaluation should be documented and should take into account, where applicable, (1) review of supplier furnished documents and records such as certificates of conformance, nonconformance notices, and corrective actions; (2) results of previous source verifications, audits, and receiving inspections; (3) operating experience of identical or similar products furnished by the same supplier; and (4) results of audits from other sources, e.g., customer, ASME, or NRC audits.</p> <p>3. If more than one purchaser buys from a single supplier, a purchaser may either perform or arrange for an audit of the supplier on behalf of itself and other purchasers to reduce the number of external audits of the supplier. The scope of this audit should satisfy the needs of all of the purchaser, and the audit report should be distributed to all the purchasers for whom the audit was conducted. Nevertheless, each of the purchasers relying on the results of an audit performed on behalf of several purchasers remains individually responsible for the adequacy of the audit.</p>	

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<p>be audited by the purchaser on a triennial basis with the audit implemented in accordance with Section 4, "Audit Implementation," of ANSI/ASME N45.2.12-1977. The triennial period should begin with performance of an audit when sufficient work is in progress to demonstrate that the organization is implementing a Quality Assurance Program having the required scope for purchases placed during the triennial period.</p>		
<p>N45.2.12 § 3.4 Audit Planning - ... The audit system shall be periodically reviewed, and revised as necessary, to assure that coverage and schedule reflect current activities. N18.7, ¶ 4 Periodic review of the audit program shall be performed by the independent review body or by a management representative at least semiannually to assure that audits are being accomplished in accordance with requirements of technical specifications and of this Standard.</p>	<p>The audit schedule shall be reviewed periodically and revised as necessary to assure that coverage is maintained current.</p>	<p>Similar requirement. N18.7 assigns the review responsibility to the independent review body or a management representative and specifies the review to be at least semiannually. Addressed in the QAPD by the Section on Independent Review (Appendix B).</p>
<p>N45.2 ¶ 6 Audits should be conducted periodically or on a random, unscheduled basis, or both. It is desirable to conduct audits when one or more of the following conditions exist: (1) When it is necessary to determine the capability of a subcontractor's Quality Assurance Program prior to awarding of contract or purchase order. (2) When, after award of contract, sufficient time has elapsed for the implementation of the Quality Assurance Program, and it is appropriate to determine that the organization is performing the functions as defined in the Quality Assurance Program description, codes, standards, and other contract documents. (3) When significant changes are made in functional areas of the Quality Assurance Program, including significant reorganizations and procedure revisions. (4) When it is suspected that safety, performance, or reliability of the item is in jeopardy due to deficiencies and nonconformances in the Quality Assurance Program. (5) When a systematic, independent assessment of program effectiveness or item quality or both is considered necessary. (6) When it is considered necessary to verify implementation of required corrective actions. N45.2.12 § 3.5.3 Regularly scheduled audits should be</p>	<p>Regularly scheduled audits shall be supplemented by additional audits of specific subjects when necessary to provide adequate coverage.</p>	<p>Similar requirement, but NQA-1 is not as specific as to when additional audits are necessary. The list of conditions for conducting supplemental audits is contained in NQA-1, Appendix 18A-1, § 2.4, as nonmandatory guidance. This alternative is encompassed by Reg. Guide 1.28, Reg. Position C.3.2.</p>

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<p>supplemented by audits for one or more of the following conditions:</p> <p>3.5.3.1 When it is necessary to assess the capability of a contractor's quality assurance program prior to awarding a contract or purchase order.</p> <p>Alternative from the current VA QA Topical Report.</p> <p>(6) With regard to Section 3.5 of ANSI N45.2.12-1977, titled Scheduling: Subsection 3.5.3.1 is interpreted to mean that the Company may procedurally review qualification of a contractor's or supplier's quality assurance program prior to awarding a contract or purchase order by means other than audit.</p> <p>3.5.3.2 When, after award of a contract, sufficient time has elapsed for implementing the quality assurance program and it is appropriate to determine that the organization is adequately performing the functions as defined in the quality assurance program description, codes, standards, and other contract documents.</p> <p>3.5.3.3 When significant changes are made in functional areas of the quality assurance program such as significant reorganization or procedure revisions.</p> <p>3.5.3.4 When it is suspected that the quality of the item is in jeopardy due to deficiencies in the quality assurance program.</p> <p>3.5.3.5 When a systematic, independent assessment of program effectiveness is considered necessary.</p> <p>3.5.3.6 When necessary to verify implementation of required corrective action.</p> <p>Reg. Guide 1.144, C.4.a.- The guideline [indicated by the verb "should"] concerning supplementing regularly scheduled audits for Sections 3.5.3.3 through 3.5.3.5 [... have sufficient safety importance to be treated the same as the requirements (indicated by the verb "shall") of the standard.]</p> <p>Reg. Guide 1.144, C.6 – The guideline in Section 3.5.3.6 of ANSI/ASME N45.2.12-1977 recommending an audit "when necessary to verify implementation of required corrective action" does not meet the provisions of Criterion XVIII of Appendix B to 10 CFR Part 50. Audits as well as other</p>		

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methods of surveillance can be used to verify implementation of required corrective action.		
N45.2.12 § 4. AUDIT IMPLEMENTATION - 4.1 General - ... The mechanics involved in implementation of an audit are preparation, performance, reporting, and follow-up.		Not a requirement.
N45.2.12 § 4.2 Preparation - Preparation includes the development of a written audit plan, the selection and orientation of the auditor(s), and notification of the organization to be audited.	3 PREPARATION	Not a requirement.
	3.1 Audit Plan	
N45.2 ¶ 5 An audit plan should be developed to provide information about the audit, such as the functional areas to be audited, the names and assignments of those who will perform the audit, the scheduling arrangements, and the method of reporting findings and recommendations. N45.2.12 § 4.2.1 Written Plan. An individual audit plan describing the audit to be performed shall be developed and documented by the auditing organization. This plan shall identify the audit scope, the requirements, the activities to be audited, organizations to be notified, the applicable documents, a schedule, and written procedures or checklists.	The auditing organization shall develop and document an audit plan for each audit. This plan shall identify the audit scope, requirements, audit personnel, activities to be audited, organizations to be notified, applicable documents, schedule, and written procedures or checklists.	Similar requirement.
	3.2 Personnel	
N45.2, ¶ 1 The audits shall be performed ... by personnel not having direct responsibilities in the areas being audited. N18.7, ¶ 3 Those performing the audits may be members of the audited organization; however, they shall not audit activities for which they have immediate responsibility. N45.2.12 § 2. PERSONNEL - 2.1 General - The responsible auditing organization shall select and assign auditors who are independent of any direct responsibility for performance of the activities which they will audit. ...	The auditing organization shall select and assign auditors who are independent of any direct responsibility for performance of the activities which they will audit.	Similar requirement.
N45.2.12 § 2. PERSONNEL - 2.1 General - ... In the case of internal audits, the persons having direct responsibility for performance of the activities being audited shall not be involved in the selection of the audit team.	In the case of internal audits, personnel having direct responsibility for performing the activities being audited shall not be involved in the selection of the audit team.	Similar requirement.
N18.7, ¶ 3 While performing the audits they shall not report to a management representative who has immediate responsibility for the activity being audited.	Audit personnel shall have sufficient authority and organizational freedom to make the audit process meaningful and effective.	Similar requirement.
	3.3 Selection of Audit Team	

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	An audit team shall be identified prior to the beginning of each audit.	New requirement. This is met in current programs.
N45.2.12 § 4.2.2 Team Selection. One or more auditors comprise an audit team. A Lead Auditor shall be appointed team leader. His responsibilities include orientation of the team, coordinating the audit process, establishing the pace of the audit, assuring communications within the team and with the organization being audited, participation in the audit performance, and coordinating the preparation and issuance of reports.	This team shall contain one or more auditors and shall have an individual appointed to lead the team who organizes and directs the audit, coordinates the preparation and issuance of the audit report, and evaluates responses.	Similar requirement.
N45.2.12 § 2.3.1 Orientation to provide a working knowledge and understanding of ANSI N45.2, this standard, and the auditing organization's procedures for implementing audits and reporting results. N45.2.12 § 4.2.3 Team Orientation. The team leader shall assure that the audit team is prepared prior to initiation of the audit. Pertinent policies, procedures, standards, instructions, codes, regulatory requirements and prior audit reports, shall be made available for information and review by the auditors. Each auditor shall be provided with the audit plan. The procedures or checklists shall be prepared to assure orderly accomplishment of the audit. During the familiarization phase of the audit, particular attention shall be directed toward an understanding of internal and external organization and contractual interfaces and responsibilities of the organization to be audited.	The audit team leader shall ensure that the audit team is prepared prior to initiation of the audit.	Similar requirement to prepare the team. However, some of the specifics from N45.2.12 § 4.2.3 have been changed to nonmandatory guidance in NQA-1, Appendix 18A-1 § 3.2.
	4 PERFORMANCE	
N45.2.12 § 4.3.2 Audit Process – 4.3.2.1 Checklists or procedures shall be used to ensure depth and continuity of audits. The audit checklist is intended for use as a guide and should not restrict the audit investigation when findings raise further questions that are not specifically included in checklist.	Audits shall be performed in accordance with written procedures or checklists.	Similar requirement.
N45.2.12 § 3.5 Scheduling - 3.5.1 Auditing shall be initiated as early in the life of the activity as practicable, consistent with the schedule for accomplishing the activity, to assure timely implementation of quality assurance requirements. In any case, auditing shall be initiated early enough to assure effective quality assurance during the design, procurement	Auditing shall begin as early in the life of the activity as practical and shall be continued at intervals consistent with the schedule for accomplishing the activity.	Similar requirement.

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<p>and contracting activities.</p> <p>N45.2, ¶ 4 Audits should include an evaluation of quality assurance practices, procedures, and instructions; the effectiveness of implementation; and conformance with policy directives. In performing this evaluation, the audits should include evaluation of work areas, activities, processes, and items; and review of documents and records.</p> <p>N45.2 Audits should be performed: (1) to provide an objective, evaluation of compliance with established requirements, methods, and procedures; (2) to assess progress in assigned tasks; (3) to determine adequacy of Quality Assurance Program performance; and (4) to verify implementation of recommended corrective action.</p> <p>N45.2.12 § 4.3.2.2 Objective evidence shall be examined for compliance with quality assurance program requirements.</p> <p>N18.7, ¶ 2 Audits shall include as a minimum verification of compliance and effectiveness of implementation of internal rules, procedures (for example, operating, design, procurement, maintenance, modification, refueling, surveillance, test, security and radiation control procedures and the emergency plan), regulations and license provisions; programs for training, retraining, qualification and performance of operating staff; corrective actions taken following abnormal occurrences; and observation of performance of operating, refueling, maintenance and modification activities, including associated record keeping.</p> <p>Alternative from current VA QA Topical Report.</p> <p>(8) With regard to Section 4.3.2 of ANSI N45.2.12-1977, titled Audit Process: (a) Subsection 4.3.2.2 could be interpreted to limit auditors to the review of only objective evidence; sometimes and for some program elements, no objective evidence may be available or subjective evidence may be more appropriate. The Company will comply with an alternate sentence which reads: “When available, objective evidence shall be examined for compliance with Quality Assurance Program requirements. When subjective evidence is used (e.g., personnel interviews, direct observations by the auditor), then the audit report must indicate how the evidence was obtained.”</p>	<p>Elements that have been selected for audit shall be evaluated against specified requirements. Objective evidence shall be examined to the depth necessary to determine if these elements are being implemented effectively.</p>	<p>Similar requirements between N45.2.12 and NQA-1. ANSI N18.7 requirements addressed in the QAPD.</p>

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<p>N45.2.12 § 4.3.2.3 Selected elements of the quality assurance program shall be audited to the depth necessary to determine whether or not they are being implemented effectively.</p>		
<p>N45.2 ¶ 1 Audit results shall be documented by auditing personnel and shall be reviewed by management having responsibility in the area audited. N18.7 ¶ 2 Written reports of such audits shall be reviewed by the independent review body and by appropriate members of management including those having responsibility in the area audited.</p>	<p>Audit results shall be documented by auditing personnel and shall be reviewed by management having responsibility for the area audited.</p>	<p>Similar requirements. N18.7 adds requirement for review by independent review body. Addressed in the QAPD, Appendix B.</p>
<p>N45.2.12 § 4.3.2.6 Conditions requiring immediate corrective action shall be reported immediately to management of the audited organization.</p>	<p>Conditions requiring prompt corrective action shall be reported immediately to management of the audited organization.</p>	<p>Similar requirement.</p>
	<p align="center">5 REPORTING</p>	
<p>N45.2.12 § 4.4 Reporting An audit report, which shall be signed by the audit team leader, shall provide: Alternative from the current VA QA Topical Report. (10) With regard to Section 4.4 of ANSI N45.2.12-1977, titled Reporting: (a) This Section requires that the audit report shall be signed by the audit team leader; this is not always the most expeditious route to take to assure that the audit report is issued as soon as practical. The Company will comply with Section 4.4 as clarified in the following opening statement: “An audit report, which shall be signed by the audit team leader, the Nuclear Specialist (Audit Coordinator) or his supervisor in his absence, shall provide”: In cases where the audit report is not signed by the Audit Team Leader due to his absence, one record copy of the report must be signed by the Audit Team Leader upon his return. The report shall not require the Audit Team Leader’s review, concurrence, or signature if the Audit Team Leader is no longer employed by the auditing organization at the time the audit report is issued. N45.2.12 § 4.4.1 Description of the audit scope. N45.2.12 § 4.4.2 Identification of the auditors. N45.2.12 § 4.4.3 Persons contacted during pre-audit, audit, and post-audit activities.</p>	<p>The audit report shall be signed by the audit team leader and issued, and it shall include the following information, as appropriate: (a) description of the audit scope; (b) identification of the auditors; (c) identification of persons contacted during audit activities; (d) summary of audit results, including a statement on the effectiveness of the quality assurance program elements which were audited; (e) description of each reported adverse audit finding in sufficient detail to enable corrective action to be taken by the audited organization.</p>	<p>Similar requirement. NQA-1 does not require the reporting on recommendations for correcting program deficiencies or improving the quality assurance program. This is consistent with one of the previous alternatives. The other alternatives are no longer considered necessary for the program.</p>

<p align="center">CRITERION 18 ANSI N45.2-77/N45.2.12-77 /ANSI N18.7-76</p>	<p align="center">BASIC REQUIREMENT 18 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>Alternative from the current VA QA Topical Report. (b) The Company will comply with subsection 4.4.3 clarified to read: “Supervisory level personnel with whom significant discussions were held during the course of pre-audit (where conducted), audit, and post-audit (where conducted) activities. N45.2.12 § 4.4.4 A summary of audit results, including an evaluation statement regarding the effectiveness of the quality assurance program elements which were audited. N45.2.12 § 4.4.5 Description of each quality assurance program deficiency in sufficient detail to assure that corrective action can be effectively carried out by the audited organization. N45.2.12 § 4.4.6 Recommendations for correcting program deficiencies or improving the quality assurance program as appropriate. Alternative from the current VA QA Topical Report. (c) Subsection 4.4.6 requires audit reports to include recommendations for corrective actions; the Company may choose not to comply with this requirement. Instead, Audit Team Leaders are required to document all adverse findings on audit finding forms. The procedure for processing audit findings allows the Audit Team Leader to document actions which are considered necessary to correct the finding; the Audit Team Leader may also document actions which are considered unacceptable for correcting the finding: the audit finding with these “Recommendations” is then transmitted to the audited organization. In addition, the Audit Team Leader is required to review the response to the audit finding and determine if it is acceptable. Any disagreements must be escalated to higher management for resolution.</p>		
	<p align="center">6 RESPONSE</p>	
<p>N45.2, ¶ 1 Responsible management shall take necessary action to correct the deficiencies revealed by the audit. N18.7, ¶ 3 Appropriate and timely followup action, ... , shall be taken. N45.2.12 § 4.3.2.4 When a nonconformance or quality assurance program deficiency is identified as a result of an audit, further investigation shall be conducted by the audited</p>	<p>Management of the audited organization or activity shall investigate adverse audit findings, schedule corrective action, including measures to prevent recurrence, and notify the appropriate organization in writing of action taken or planned.</p>	<p>Similar requirements to ensure the objective of correcting deficiencies is achieved. NQA-1 uses the terms “adverse audit findings” as opposed to “a nonconformance or quality assurance program deficiency.” NQA-1 doesn’t specify a time period</p>

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<p>organization in an effort to identify the cause and effect and to determine the extent of the corrective action required.</p> <p>Alternative from current VA QA Topical Report.</p> <p>(8) With regard to Section 4.3.2 of ANSI N45.2.12-1977, titled Audit Process: (b)Subsection 4.3.2.4 is modified as follows to take into account the fact that some non-conformances are virtually “obvious” with respect to the needed corrective action: “When a non-conformance or quality assurance program deficiency is identified as a result of an audit, unless the apparent cause, extent and corrective action are readily evident, further investigation shall be conducted by the audited organization in an effort to identify the cause and effect and to determine the extent of the corrective action required.”</p> <p>N45.2.12 § 4.5 Follow-up - 4.5.1 By Audited Organization. Management of the audited organization or activity shall review and investigate any adverse audit findings to determine and schedule appropriate corrective action including action to prevent recurrence and shall respond as requested by the audit report, giving results of the review and investigation. The response shall clearly state the corrective action taken or planned to prevent recurrence. In the event that corrective action cannot be completed within thirty days, the audited organization's response shall include a scheduled date for the corrective action. The audited organization shall provide a follow-up report stating the corrective action taken and the date corrective action was completed. They shall also take appropriate action to assure that corrective action is accomplished as scheduled.</p> <p>Alternative from current VA QA Topical Report.</p> <p>(11) With regard to Section 4.5.1 of ANSI N45.2.12-1977, titled By Audited Organization: The Company will comply with the following clarification of this Section: “Management of the audited organization or activity shall review and investigate all adverse findings, as necessary, (e.g., where the cause is not already known, another organization has not already investigated and found the cause, etc.) to determine and schedule appropriate corrective action including action to prevent recurrence. They shall</p>		<p>for the response and this will be specified in the implementing program. Appendix 18A-1 of NQA-1 provides nonmandatory guidance related to the follow-up by the audited organization recommending that the organization respond prior to the requested date. Also, the guidance recommends that the organization provide a follow-up report on corrective action, but this is not required, and is similar to a previous alternative used by Dominion. The alternatives to 4.3.2.4 and 4.5.1 are no longer required. NQA-1 does not specify the performance of further investigation, and even when the “needed corrective action” is “virtually ‘obvious’” that would still include some level of investigation into the condition in order to determine corrective action; therefore, the language of NQA-1 encompasses the intent of the alternatives.</p>

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<p>respond, in writing, within thirty days after the date of issuance of the audit report.</p> <p>The response shall clearly state the corrective action taken or planned to prevent recurrence and the results of the investigation if conducted. In the event that corrective action is not completed by the time the response is submitted, the audited organization's response shall include a scheduled date for completion of planned corrective action. The audited organization shall take the appropriate action to assure that corrective action is accomplished as scheduled.</p>		
<p>N45.2.12 § 4.5.2.2 Evaluate the adequacy of the response.</p>	<p>The adequacy of audit responses shall be evaluated by or for the auditing organization.</p>	<p>Similar requirement.</p>
	<p>7 FOLLOWUP ACTION</p>	
<p>N45.2, ¶ 3 Deficient areas should be re-audited until corrections have been accomplished.</p> <p>N18.7, ¶ 3 Appropriate and timely followup action, including re-audit of deficient areas, shall be taken.</p> <p>N45.2.12 § 4.5.2 By Auditing Organization. When necessary, follow-up actions shall be performed by the audit team leader or management of the auditing organization to:</p> <p>4.5.2.1 Obtain the written response when required by the audit report.</p> <p>4.5.2.3 Assure that corrective action is identified and scheduled for each adverse, finding.</p> <p>4.5.2.4 Confirm that corrective action is accomplished as scheduled.</p>	<p>Follow-up action shall be taken to verify that corrective action is accomplished as scheduled.</p>	<p>Similar requirement. NQA-1 does not contain as much detail on how to accomplish the follow-up in the requirements section.</p> <p>Details of performing followup is considered nonmandatory guidance in Appendix 18A-1 § 7.</p>
	<p>8 RECORDS</p>	
<p>N45.2.12 § 5.2 Audit Records - Records shall be generated and retained for all audits. Records shall include the audit system plan, individual audit plans, audit reports, written replies, and the record of completion of corrective actions.</p> <p>Reg. Guide 1.144, C.7 – The requirements of ANSI/ASME N45.2.12-1977 contained in the second sentence of Section 5.2, "Audit Records," read "Records shall include ... [see above text]." Additionally, these records should include documents associated with the conduct of audits that support audit findings (for example, audit checklists or procedures).</p>	<p>Audit records shall include audit plans, audit reports, written replies, and the record of completion of corrective action.</p>	<p>Similar requirement.</p>
<p>N18.7 ¶ 5 Further guidance on requirements for auditing of quality assurance programs for nuclear power plants exists in</p>		<p>Not a requirement.</p>

<p align="center">CRITERION 18 ANSI N45.2-77/N45.2.12-77 /ANSI N18.7-76</p>	<p align="center">BASIC REQUIREMENT 18 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>ANSI N45.2.12, "Requirements for Auditing Quality Assurance Programs for Nuclear Power Plants."</p>		
<p>N45.2.12 § 1.2 Applicability - The requirements of this standard apply to both internal and external audits performed by or for the plant owner, contractors, and other organizations participating in activities affecting the quality of structures, systems, and components of nuclear power plants in accordance with requirements of ANSI N45.2. This standard is not applicable to surveillance or inspections for the sole purpose of process control or product acceptance. The ASME Boiler and Pressure Vessel Code (here after referred to as the Code) 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. However, a standard does not apply to activities covered by Section III, Div. I and 2, and Section XI of the Code for those activities covered by the Code. Reg. Guide 1.144, C.2. – The Foreword and Section 1.2, "Applicability," of ANSI/ASME N45.2.12-1977 state: "The ASME Boiler ... [See above text]" While Section III, Divisions 1 and 2, and Section XI of the ASME Boiler and Pressure Vessel Code address general requirements for quality assurance program audits, these sections do not explicitly address all the activities described in ANSI/ASME N45.2.12-1977. ANSI/ASME N45.2.12-1977, subject to the exceptions of the regulatory position, should be used in conjunction with Section III, Divisions 1 and 2, and Section XI of the ASME Boiler and Pressure Vessel Code for auditing quality assurance programs where the ASME Code does not address the activities covered by N45.2.12-1977.</p>		<p>Applicability is addressed in the Introduction to NQA-1, Part I. The requirements are similar. The limitation regarding surveillance or inspections of N45.2.12, § 1.2, Sentence 2 is addressed in the NQA-1 definition for audit. The applicability of the QAPD includes using its provisions to supplement the ASME Code QA requirements.</p>
<p>N45.2.12 § 1.3 Responsibility - The organization or organizations responsible for implementation of the applicable requirements of this standard shall be identified and the scope of their responsibilities and authorities shall be documented. The work of establishment practices and procedures and providing the resources in terms of personnel, equipment and services necessary to meet the requirements of this standard may be delegated to other</p>	<p>Reg. Guide 1.28, Rev. 3, C.3.2.3 – If more than one purchaser buys from a single supplier, a purchaser may either perform or arrange for an audit of the supplier on behalf of itself and other purchasers to reduce the number of external audits of the supplier. The scope of this audit should satisfy the needs of all of the purchasers, and the audit report should be distributed to all the purchasers for whom the audit was conducted. Nevertheless, each of the purchasers relying on</p>	<p>Responsibility is addressed by NQA-1 in the Introduction to Part I. The requirements are similar to the first paragraph of N45.2.12. The second paragraph of N45.2.12 is essentially addressed in NQA-1, Basic Requirement 1 and Supplement 1S-1 dealing with the Organization.</p>

<p align="center">CRITERION 18 ANSI N45.2-77/N45.2.12-77 /ANSI N18.7-76</p>	<p align="center">BASIC REQUIREMENT 18 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>organizations and such delegation shall also be documented.</p> <p>It is the responsibility of each organization performing any activity covered by this standard to comply with the requirements of this standard applicable to its work. The organizational structure, functional responsibilities, levels of authority, and lines of internal and external communication for management direction of audits of the quality assurance program shall be documented. Where multiple organizational arrangements exists, the interface responsibilities of each organization shall be clearly defined and documented. In no way shall the performance of audits by an organization diminish the responsibility of the audited organization or contractor for audit of his designated portion of the quality assurance program or the quality of his product or services.</p> <p>Reg. Guide 1.144, C.5 – Regulatory Position C.3 provides guidance on scheduling internal and external audits. Section 1.3, “Responsibility,” of ANSI/ASME N45.2.12-1977 states: “The work of ... [see above text].” Where more than one purchaser buys from a single supplier, a purchaser may perform an audit of the supplier on behalf of more than one purchaser in order to reduce the number of external audits of the supplier. The results of this audit should be distributed to all purchasers for whom the audit was conducted.</p>	<p>the results of an audit performed on behalf of several purchasers remains individually responsible for the adequacy of the audit.</p>	
<p>N45.2.12 § 1.4 Definitions - The following definitions are provided to assure a uniform understanding of select terms as they are used in this standard:</p>	<p>The following definitions are taken from NQA-1, Part I, Introduction.</p>	<p>Definitions are addressed by NQA-1 in the Introduction to Part I.</p>
<p>N45.2.12 Audit - A documented activity performed in accordance with written procedures or checklists to verify, by examination and evaluation of objective evidence, that applicable elements of the quality assurance program have been developed, documented and effectively implemented in accordance with specified requirements. An audit should not be confused with surveillance or inspection for the sole purpose of process control or product acceptance.</p>	<p>Audit – a planned and documented activity performed to determine by investigation, examination, or evaluation of objective evidence the adequacy of and compliance with established procedures, instructions, drawings, and other applicable documents, and the effectiveness of implementation. An audit should not be confused with surveillance or inspection activities performed for the sole purpose of process control or product acceptance.</p>	<p>Similar definition.</p>
<p>N45.2.12 Internal Audits - Audits of those portions of an organization's quality assurance program retained under its direct control and within its organizational structure.</p>	<p>Audit, internal – an audit of those portions of an organization’s quality assurance program retained under its direct control and within its organizational structure</p>	<p>Similar definition.</p>

CRITERION 18 ANSI N45.2-77/N45.2.12-77 /ANSI N18.7-76	BASIC REQUIREMENT 18 NQA-1 1994	COMMENTS
N45.2.12 External Audits - Audits of those portions of an organization's quality assurance program not retained under its direct control and not within its organizational structure.	Audit, external – an audit of those portions of another organization’s quality assurance program not under the direct control or within the organizational structure of the auditing organization	Similar definition.
N45.2.12 Auditor - Any individual who performs any portion of an audit, including lead auditors, technical specialists and others such as management representatives and auditors in training.		Not defined in NQA-1, but described in Supplement 2S-3 in a way that is similar to the definition of N45.2.12.
N45.2.12 Lead Auditor - An individual qualified to organize and direct an audit, report audit findings and evaluate corrective actions.		Not defined in NQA-1, but described in NQA-1, Supplement 18S-1 (subsection 3.3) and Supplement 2S-3 in a way that is similar to the definition of N45.2.12.
N45.2.12 Program Deficiencies - Failure to develop, document or implement effectively any applicable element of the quality assurance program required by ANSI N45.2.		Not defined in NQA-1. NQA-1 uses the term adverse findings, but does not define that. Will address in Appendix D to the new QAPD.
N45.2.12 Other terms and their definitions are contained in ANSI N45.2.10.		Definitions are addressed by NQA-1 in the Introduction to Part I. This is comparable to N45.2.10.
N45.2.12 § 1.5 Referenced Documents - Documents that are required to be included as a part of this standard are identified at the point of reference or described in Section 6 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 6 of this standard unless otherwise specified in the contract document. Reg. Guide 1.144 , C.1. – Section 1.5, “Referenced Documents,” of ANSI/ASME N45.2.12-1977 states that documents that are required to be included as a part of the standard are identified at the point of reference or described in Section 6 of the standard. The specific applicability of these listed documents has been addressed in the latest revision of the following regulatory guides: ANSI Standard Regulatory Guide N45.2 1.28 N45.2.9 1.88 N45.2.10 1.74		There are no referenced documents for this section of NQA-1. The QAPD addresses Dominion’s position on referenced documents and the Reg. Guides and Standards that apply to the QA program.
N45.2.12 § 2.2 Personnel Qualification - The responsible auditing organization shall establish the audit personnel		Personnel Qualification is addressed in NQA-1 Basic Requirement 2 and

CRITERION 18 ANSI N45.2-77/N45.2.12-77 /ANSI N18.7-76	BASIC REQUIREMENT 18 NQA-1 1994	COMMENTS
<p>qualifications and the requirements for the use of technical specialists to assist in the auditing of the quality assurance programs. Personnel selected for quality assurance auditing assignments shall have experience or training commensurate with the scope, complexity or special nature of the activities to be audited.</p> <p>Alternative from the current VA QA Topical Report. (2) With regard to Section 2.2 of ANSI N45.2.12-1977, titled Personnel Qualifications: The qualification of Company audit personnel will be accomplished as described to meet the requirements of ANSI N45.2.23-1978 as endorsed in Table 17.2.0 and Sections 17.2.2 and 17.2.18 of the Operational QA Program.</p>		<p>Supplement 2S-3. Alternative not needed since NQA-1 contains training and qualification requirements in one location.</p>
<p>N45.2.12 § 2.3 Training - Auditors shall have, or be given, appropriate training or orientation to develop their competence for performing required audits. Competence of personnel for performance of the various auditing functions shall be developed by one or more of the following methods: Alternative from the current VA QA Topical Report. (3) With regard to Section 2.3 (and subsections 2.3.1 through 2.3.3) of ANSI N45.2.12-1977, titled Training: The training of Company audit personnel will be accomplished as described to meet the requirements of ANSI N45.2.23-1978 as endorsed in Table 17.2.0 and Sections 17.2.2 and 17.2.18 of the Operational QA Program.</p>		<p>Training requirements are addressed in NQA-1 Basic Requirement 2 and Supplement 2S-3. Alternative not needed since NQA-1 contains training and qualification requirements in one location.</p>
<p>N45.2.12 § 2.3.2 Training programs to provide general and specialized training in audit performance. General training shall include fundamentals, objectives, characteristics, organization, performance and results of quality assurance program auditing. Specialized training shall include methods of examining, questioning, evaluating, and documenting specific audit items and methods of closing out audit findings.</p>		<p>Training requirements are addressed in NQA-1 Basic Requirement 2 and Supplement 2S-3.</p>
<p>N45.2.12 § 2.3.3 On-the-job training, guidance, and counseling performed under the direct supervision of a Lead Auditor. Such training shall include planning, performing, reporting, and follow-up action involved in conducting audits.</p>		<p>Training requirements are addressed in NQA-1 Basic Requirement 2 and Supplement 2S-3.</p>
<p>N45.2.12 § 2.4 Maintenance of Proficiency</p>		<p>Requirements to maintain proficiency</p>

<p align="center">CRITERION 18 ANSI N45.2-77/N45.2.12-77 /ANSI N18.7-76</p>	<p align="center">BASIC REQUIREMENT 18 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>Lead Auditors shall maintain their proficiency through one or more of the following methods:</p> <p>2. 4.1 Regular, active participation in the audit process.</p> <p>2.4.2 Review and study of codes, standards, procedures, instructions, and other documents related to quality assurance programs and program auditing.</p> <p>2.4.3 Participation in training programs as described in Section 2.3.</p> <p>Alternative from the current VA QA Topical Report.</p> <p>(4) With regard to Section 2.4 of ANSI N45.2.12-1977, titled Maintenance of Proficiency: The maintenance of proficiency of the Company audit personnel will be accomplished as described to meet the requirement of ANSI N45.2.23-1978 as endorsed in Table 17.2.0 and Sections 17.2.2 and 17.2.18 of the Operational QA Program.</p>		<p>are addressed in NQA-1 Basic Requirement 2 and Supplement 2S-3. Alternative not needed since NQA-1 contains training and qualification requirements in one location.</p>
<p>N45.2.12 § 3.2 Objectives</p> <p>The objectives of the audit system are:</p> <p>3.2.1 To determine that a quality assurance program has been developed and documented in accordance with specified requirements;</p> <p>3.2.2 To verify by examination and evaluation of objective evidence that the documented quality assurance program has been implemented;</p> <p>3.2.3 To assess the effectiveness of the quality assurance program;</p> <p>3.2.4 To identify nonconformances and quality assurance program deficiencies; and</p> <p>3.2.5 To verify correction of identified quality assurance program deficiencies.</p>		<p>Addressed as nonmandatory guidance in NQA-1, Appendix 18A-1, § 2.1</p>
<p>N45.2.12 § 3.3 Essential Elements of the Audit System</p> <p>An effective audit system shall be established and maintained and shall include the following essential elements:</p> <p>3.3.1 A management policy statement or procedure which establishes organizational independence and authority of the auditors and commits the organization to an audit system meeting the requirements of a standard.</p> <p>3.3.2 Manpower, funding, and facilities to implement the audit system.</p>		<p>Addressed as nonmandatory guidance in NQA-1, Appendix 18A-1, § 2.2. Alternatives to 3.3.5, 6, and 7 no longer needed since this is now guidance and not requirements.</p>

<p align="center">CRITERION 18 ANSI N45.2-77/N45.2.12-77 /ANSI N18.7-76</p>	<p align="center">BASIC REQUIREMENT 18 NQA-1 1994</p>	<p align="center">COMMENTS</p>
<p>3.3.3 Identification of those responsible for the audit system, including a delineation of their authorities, responsibilities, and organizational independence.</p> <p>3.3.4 Provisions for reasonable and timely access of audit personnel to facilities, documents, and personnel necessary in the planning and performance of the audits.</p> <p>3.3.5 Provisions for reporting on the effectiveness of a quality assurance program to the responsible management of both the audited and auditing organizations.</p> <p>Alternative from the current VA QA Topical Report.</p> <p>(5) With regard to Section 3.3 of ANSI N45.2.12-1977, titled Essential Elements of the Audit System: The Company will comply with subsection 3.6.5 [should be 3.3.5] as it was originally written (subsection 3.2.5) in ANSI N45.2.12, Draft 3, Revision 4: “Provisions for reporting on the effectiveness of the Quality Assurance Program to the responsible management.” For the auditing organization (The Company), effectiveness is reported as required by the Technical Specifications for Surry Power Station and Appendix C of this topical report for North Anna Power Station. Other than audit reports, the Company may not directly report on the effectiveness of the quality assurance programs to the audited organization when such organizations are outside of the Company.</p> <p>3.3.6 Provisions for access by audit teams to levels of management of the auditing and audited organizations shall have the responsibility and authority to assure corrective action.</p> <p>Alternative from the current VA QA Topical Report.</p> <p>(5) With regard to Section 3.3 of ANSI N45.2.12-1977, titled Essential Elements of the Audit System: Subsection 3.3.6 requirements are considered to be fulfilled by compliance with the organization and reporting measures outlined in the Operational QA Program, the Technical Specifications for Surry Power Station and Appendix C of this topical report for North Anna Power Station.</p> <p>3.3.7 Provision for verification of effective corrective action on a timely basis.</p> <p>Alternative from the current VA QA Topical Report.</p>		

CRITERION 18 ANSI N45.2-77/N45.2.12-77 /ANSI N18.7-76	BASIC REQUIREMENT 18 NQA-1 1994	COMMENTS
<p>(5) With regard to Section 3.3 of ANSI N45.2.12-1977, titled Essential Elements of the Audit System: Subsection 3.3.7 requires verification of effective corrective action on a “timely basis.” Timely basis is interpreted to mean within the framework or period of time for completion of corrective action that is accepted by Nuclear Oversight. Each finding requires a response and a corrective action completion date; these dates are subject to revision (with the approval of Nuclear Oversight) and must be escalated to higher authority when there is disagreement between the audited and the auditing organization on what constitutes “timely corrective action..”</p>		
<p>N45.2.12 § 4.2.2 Team Selection. ... In selecting personnel for auditing assignments, consideration shall be given to special abilities, specialized technical training, prior pertinent experience, personal characteristics, and education.</p>		<p>NQA-1 addresses considerations for personnel selection as nonmandatory guidance in Appendix 18A-1 § 3.1.</p>
<p>N45.2.12 § 4.2.4 Audit Notification. Involved organizations shall be notified of a scheduled audit a reasonable time before the audit is to be performed. This notification should be in writing and include such information as the scope and schedule of the audit and the name of the audit team leader. With prior agreement of the parties involved, unannounced audits may be performed.</p>		<p>NQA-1 addresses the audit notification as nonmandatory guidance in Appendix 18A-1 § 3.3. The VA QA Topical Report alternative related to notification is no longer needed.</p>
<p>N45.2.12 § 4.3 Performance - 4.3.1 Pre-Audit Conference. A brief preaudit conference shall be conducted with cognizant organization management. The purpose of the conference shall be to confirm the audit scope, present the audit plan, introduce auditors, meet counterparts, discuss audit sequence and plans for the post-audit conference, and establish channels of communication.</p> <p>Alternative from current VA QA Topical Report. (7) With regard to Section 4.3.1 of ANSI N45.2.12-1977, titled Pre-Audit Conference: The Company will comply with requirements of this Section by inserting the word “Normally” at the beginning of the first sentence. This clarification is required because in the case of certain unannounced audits or audits of a particular operation or work activity, a pre-audit conference might interfere with the spontaneity of the operation or activity being audited. In</p>		<p>NQA-1 addresses the preaudit conference as nonmandatory guidance in Appendix 18A-1 § 4.1.</p>

CRITERION 18 ANSI N45.2-77/N45.2.12-77 /ANSI N18.7-76	BASIC REQUIREMENT 18 NQA-1 1994	COMMENTS
<p>other cases, persons who should be present at a pre-audit conference may not always be available. Such lack of availability should not be an impediment to beginning an audit. Even in the above examples, which are not intended to be all inclusive, the material set forth in Section 4.3.1 will normally be covered during the course of the audit.</p>		
<p>N45.2.12 § 4.3.2.5 Nonconformances or quality assurance program deficiencies should be acknowledged by a member of the audited organization. Alternative from current VA QA Topical Report. (8) With regard to Section 4.3.2 of ANSI N45.2.12-1977, titled Audit Process: (c) Subsection 4.3.2.5 contains a recommendation which is clarified with the definition of “acknowledged by a member of the audited organization” to mean that a “member of the audited organization has been informed of the findings.” Agreement or disagreement with a finding may be expressed in the response from the audited organization.</p>		<p>Not a requirement and not addressed in NQA-1. Alternative should no longer be necessary since this is guidance.</p>
<p>N45.2.12 § 4.3.2.7 Specific attention should be given to corrective action on program deficiencies identified during previous audits. Reg. Guide 1.144, C.4.b. – The guideline [indicated by the verb “should”] concerning corrective action on program deficiencies identified during previous audits ... [have sufficient safety importance to be treated the same as the requirements (indicated by the verb “shall”) of the standard.] In this regard, corrective action on program deficiencies identified during previous audits is construed to mean “corrective action on program deficiencies in the area that is being audited.</p>		<p>Requirement not addressed in NQA-1. Corrective action is an element evaluated in each audit as stated in the QAPD, Appendix C.</p>
<p>N45.2.12 § 4.3.3 Post-Audit Conference. At the conclusion of the audit process, a post-audit conference shall be held with management of the audited organization to present audit findings and clarify misunderstandings. Alternative from current VA QA Topical Report. (9) With regard to Section 4.3.3 of ANSI 45.2.12-1977, titled Post-Audit Conference: The Company will substitute and comply with the following paragraph: “For all external audits, a post-audit conference shall be held with</p>		<p>NQA-1 addresses the postaudit conferences as nonmandatory guidance in Appendix 18A-1 § 4.3 Alternative is no longer needed for NQA-1 since the requirements have become guidance. Internal procedures use that guidance in directing the postaudit conference.</p>

CRITERION 18 ANSI N45.2-77/N45.2.12-77 /ANSI N18.7-76	BASIC REQUIREMENT 18 NQA-1 1994	COMMENTS
<p>management of the audited organization to present audit findings and clarify misunderstandings; where no adverse findings exist, this conference may be waived by management of the audited organization: such waiver shall be documented in the audit report. Unless unusual operating or maintenance conditions preclude attendance by appropriate managers/supervisors, a post-audit conference shall be held with managers/supervisors for all internal audits for the same reasons as above. Again, if there are no adverse findings, management of the internal audited organization may waive the post-audit conference: such waiver shall be documented in the audit report.”</p>		
<p>N45.2.12 § Distribution of the report shall include responsible management of both the audited and auditing organizations. The audit report shall be issued within thirty days after the post-audit conference.</p>		<p>NQA-1 requires reporting audit results to management in Basic Requirement 18. The details of report distribution are addressed as nonmandatory guidance in Appendix 18A-1 § 5.</p>
<p>N45.2.12 § Follow-up action can be accomplished through written communication, re-audit, or other appropriate means.</p>		<p>Not a requirement.</p>
<p>N45.2.12 § 5. RECORDS - 5.1 General - Records shall be retained by the auditing organizations responsible for activities associated with implementation of this standard. These records shall be collected, stored, and maintained in accordance with ANSI N45.2.9.</p>		<p>NQA-1 addresses general records requirements, including those for audits, in Basic Requirement 17 and Supplement 17S-1 along with other records.</p>
<p>N45.2.12 § 5.3 Personnel Records - Records shall include documentary evidence of the qualifications and training of auditors and shall be retained for the same period of time as required for the audit report with which the auditors are associated.</p>		<p>NQA-1 addresses qualification and training records for audit personnel in Basic Requirement 2 and Supplement 2S-3.</p>

Cleaning of Fluid Systems and Associated Components During Construction Phase of Nuclear Power Plants ANSI N45.2.1 -1973	Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components for Nuclear Power Plants NQA-1-1994, Subpart 2.1	Comments
1. INTRODUCTION	1 GENERAL	
1.1 Scope		
<p>This standard covers on-site cleaning of materials and components, cleanness control, and pre-operational cleaning and layup of important nuclear power plant fluid systems during construction. These systems include those whose satisfactory performance is required for safe and reliable operation of the plant. The requirements may also be extended to other parts of nuclear power plants when specified in contract documents. 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 preoperational testing. 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. 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. This standard is intended to be used in conjunction with ANSI N45.2 Quality Assurance Requirements for Nuclear Power Plants.</p>	<p>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 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.</p>	<p>N45.2.1 was applicable just during construction. NQA-1 refers to “manufacturing, construction, repairs, and modifications.”</p>
1.2 Applicability		
<p>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. The extent to which the individual requirements of this standard will apply will depend upon the nature and scope 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</p>	<p>See NQA-1, Introduction, Section 2 for Applicability</p>	<p>NQA-1 is similar but refers to Operating Units also. VA Clarification not required under NQA-1-1994.</p>

Cleaning of Fluid Systems and Associated Components During Construction Phase of Nuclear Power Plants ANSI N45.2.1 -1973	Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components for Nuclear Power Plants NQA-1-1994, Subpart 2.1	Comments
<p>construction of power plants and that the quality of items is maintained as a result of the use of proper cleaning practices and techniques during construction.</p> <p>Reg. Guide 1.37-3/73 Position C.2 states: Although subdivision 1.2 of ANSI N45.2.1-1973 states that the requirements promulgated apply during the construction phase of a nuclear power plant, many of the requirements and recommendations contained in the standard are also appropriate to cleaning of fluid systems and associated components during the operation phase of a nuclear power plant, and they should be used when applicable. In this regard, however, it should be particularly noted that decontamination and cleanup of radioactively contaminated systems and components are not addressed by ANSI N45.2.1-1973. These operations will be considered separately in future regulatory guides.</p> <p>The following is a clarification made in the current VA QATR: (1) The guide and standard are applicable to those areas of the Quality Assurance Program addressing on-site cleaning of materials and components, cleanness control, and preoperation cleaning and layup of fluid systems.</p>		
<p>1.3 Responsibility</p>		
<p>The organization or organizations responsible for the activities covered by this standard shall be identified and the scope of their responsibility shall be documented. 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. 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. Each organization participating in site construction activities shall comply with procedures and instructions issued for the</p>	<p>See NQA-1, Subpart 2, Introduction, Section 3 for Responsibility and NQA-1, Subpart 2, Section 4 for General Planning and Procedures.</p>	<p>ANSI N45.2.1 focuses on construction phase. Otherwise, similar requirements if considering other parts of NQA-1 (e.g. Basic Requirements 1, 5, etc.)</p>

Cleaning of Fluid Systems and Associated Components During Construction Phase of Nuclear Power Plants ANSI N45.2.1 -1973	Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components for Nuclear Power Plants NQA-1-1994, Subpart 2.1	Comments
<p>project and with those requirements of this standard applicable to his work. The organization responsible for performing the cleaning shall identify and document detailed cleaning procedures unless they are specified in the procurement documents. Requirements for review and/or approval of such procedures shall be specified in the procurement documents.</p>		
1.4 Definitions	1.1 Definitions	
<p>The following definitions are provided to assure a uniform understanding of select terms as they are used in this standard.</p>	<p>The following definitions are provided to assure a uniform understanding of unique terms as they are used in Subpart 2.1.</p>	<p>No change except reference to standard</p>
<p>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.</p>	<p>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</p>	<p>No change</p>
<p>Alkaline Cleaning - The removal of organic contaminants by converting them to an emulsion with an alkaline solution such as trisodium phosphate.</p>	<p>alkaline cleaning - the removal of organic contaminants by converting them to an emulsion with an alkaline solution such as trisodium phosphate</p>	<p>No change</p>
<p>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).</p>	<p>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)</p>	<p>No change</p>
<p>Chemical Conditioning - The addition of chemicals in low concentration to flush, rinse, or layup water to prevent precipitation of dissolved solids, inhibit corrosion, etc.</p>	<p>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</p>	<p>No change</p>
<p>Cleaning - The removal of any contaminants that might have a deleterious effect on plant safety and reliable operation.</p>	<p>cleaning - the removal of any contaminants that might have a deleterious effect on operation of the plant</p>	<p>Similar</p>
<p>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, and Subcontractor or sub-tier levels of these where appropriate.</p>	<p>NQA-I, INTRO, Terms and Definitions: Supplier - any individual or organization who furnishes items or services in accordance with a procurement document. An all-inclusive term used in place of any of the following: vendor, seller, contractor, subcontractor, fabricator, consultant, and their subtier levels.</p>	<p>NQA-1, Terms and Definitions, describes "Supplier" similar to N45.2.1 "Contractor" (each references other term)</p>
<p>Contamination - Any undesirable foreign material on the surface of an item, in the atmosphere, or in process liquids or</p>	<p>Contamination - any unwanted or undesirable foreign material on the surface of an item, in the atmosphere, or in</p>	<p>Similar</p>

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gases.	process liquids or gases	
Corrosion Resistant Alloy - 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	Similar
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-tubesheet joints, and tube-to-tube support joints)	Similar
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 fluid - any gas or liquid	Similar
Documentation - Any written or pictorial information describing, defining, specifying, reporting, or certifying activities, requirements, procedures or results.	NQA-1 INTRO Definition: document - any written or pictorial information describing, defining, specifying, reporting, or certifying activities, requirements, procedures, or results. A document is not considered to be a Quality Assurance Record until it satisfies the definition of a Quality Assurance Record as defined in this Supplement.	N45.2.1 definition for "Documentation" is similar to definition in NQA-1 INTRO definition for "document."
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	No change
Inhibitor - A chemical additive which retards some specific chemical reaction.	inhibitor - a chemical additive that retards some specific chemical reaction	Similar
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	Similar
Item - Any level of unit assembly, including structure, system, subsystem, subassembly, component, part or material.	NQA-1 INTRO Definition: 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.	Similar to definition in NQA-1 INTRO definition

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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.	lay-up - 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	Same
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 chipping	Similar
Pitting - Localized corrosion resulting in surface defects.	pitting - surface defects resulting from localized corrosion	Similar
Purchaser - The agency responsible for issuance and administration of a contract, subcontract, or purchase order imposing this standard or portions hereof.	NQA-1 INTRO Definition: Purchaser - the organization responsible for establishment of procurement requirements and for issuance or administration, or both, of procurement documents	Similar definition
Rinsing - (1) 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	Similar
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.	Same
Sensitized Corrosion Resistant Alloy - Any alloy which has been subjected to heating that causes intergranular 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 Intergranular Attack in Austenitic Stainless Steel.	sensitized corrosion-resistant alloy - a corrosion-resistant alloy that has been subjected to heating that causes intergranular precipitation of chromium carbides in sufficient quantities to be detected by Practice B, C, D, E, or F of ASTM A 262, Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels	Similar

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Solvent Cleaning - Dissolving organic contaminants with an organic solvent.	solvent cleaning - removing contaminants with an organic solvent	Similar
1.5 Referenced Documents		
<p>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. Other terms and definitions are contained in ANSI N45.2.10</p> <p>Reg. Guide 1.37-3/73 Position C.1 states: Subdivision 1.5 of ANSI N45.2.1-1973 states that other documents required to be included as a part of the standard are either identified at the point of reference or described in Section 10 of the standard. The specific applicability or acceptability of these listed documents has been or will be covered separately in other regulatory guides or in Commission regulations, where appropriate..</p>	<p>See Part II, INTRODUCTION, Section 7 which refers to the NQA-1 Table entitled “Codes, Standards, and Specifications Referenced in Text” for information regarding referenced documents in NQA-1</p>	<p>Referenced documents are addressed in the QAPD, Appendix C.</p>
2.0 GENERAL REQUIREMENTS	2 GENERAL REQUIREMENTS	
<p>This section contains requirements 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. Cleanness classification for an item shall be specified in accordance with paragraph 3.1 of this standard.</p>		<p>Not requirement.</p>
<p>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</p>	<p>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:</p>	<p>Similar</p>
<p>(1) ensure the removal of any deleterious contaminants,</p>	<p>(a) ensure the removal of deleterious contaminants;</p>	<p>Same</p>
<p>(2) minimize recontamination of cleaned surfaces, and</p>	<p>(b) minimize recontamination of cleaned surfaces; and</p>	<p>Same</p>
<p>(3) minimize the cleaning required after installation.</p>	<p>(c) minimize the cleaning required after installation, repair, or modification.</p>	<p>Similar- NQA-1 includes “repair or modification”</p>

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		N45.2.1 was for construction.
	The cleanness classification of each item shall be specified in accordance with para. 3.2 of Subpart 2.1	
2.1 Planning	2.1 Planning	
The cleanness and cleanness control activities shall be planned and outlined to define cleaning and inspection operations to be used. 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.	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). 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.	Similar – with NQA-1 expanded to additional activities (modification, repair, etc.)
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.		Covered in Subpart 2 INTRO 4.1, Planning
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):	Similar
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;	Similar
2. Facilities for filters, and flushing and/or drain connections, in locations where dead legs are unavoidable;	(b) facilities for filters and flushing and drain connections in locations where dead legs are unavoidable;	Similar
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;	Similar
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;	Similar
5. Control of the installation operations so that piping and	(e) control of installation operations so that piping and	Same

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components which have already been installed are not subject to contamination when subsequent installation operations are performed;	components that have already been installed are not subject to contamination when subsequent installation operations are performed;	
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;	Same
	(g) disposal of cleaning solutions and waste water;	Added to NQA-1 (Environmentally correct)
	(h) safety, fire protection, and other hazards.	Added to NQA-1 (Env./Safety concerns)
2.2 Procedures and Instructions	2.2 Procedures and Instructions	
	2.2.1	
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.	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).	Similar
These documents shall include as appropriate:		List covered in introduction of NQA-1 regarding procedures.
1. Detailed cleaning-cleanness control procedures		
2. Personnel safety considerations		
3. Structure or facility protection consideration		
4. Inspection and test equipment requirements		
5. Sequence of work activities, inspections and tests		
6. Sequential steps for a given activity		
7. Acceptance criteria including methods for verifying cleanness		
8. Preparatory checks		
9. Approvals		
10. Responsibilities		
11. Data report forms		
	2.2.2	
The preparation of the actual working procedures or instructions to be used should consider:	Preparation of the actual cleaning procedures or instructions shall consider the following:	Similar
1. Work practices, housekeeping, access control, and	(a) work practices, housekeeping, access control, and	Same

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prevention of contamination and recontamination;	prevention of contamination and recontamination;	
2. Effectiveness of cleaning procedures for removal of the contaminants;	(b) effectiveness of cleaning methods for removal of the contaminants;	Same
	(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;	Added to NQA-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;	Similar
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;	Similar
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;	Similar
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;	Similar
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;	Similar
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;	Same
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;	Similar
10. Construction operations prohibited during cleaning operations;	(k) activities to be prohibited or constrained before, during, and after cleaning operations	Similar
11. Methods for rinsing and neutralizing including number of rinses;	(l) methods for rinsing and neutralizing, including estimated number of rinses;	Same
12. Methods for verifying cleanness;	(m) methods for verifying cleanness;	Same

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13. Methods of drying and lay-up of the system;	(n) methods for drying and lay-up;	Similar
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;	Similar
15. Methods for disposal of cleaning solutions.	(p) method of disposal of cleaning solution.	Similar
2.3 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 instruction followed in performing the task and the identification of the following:		NQA-1 does not repeat information across sections- this is covered under inspection and test sections
1. Conditions encountered which were not anticipated, including nonconformance.		
2. Identity of inspector or tester.		
3. Completion date.		
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.		
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 shall be re-cleaned 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.	Added to NQA-1
	If necessary, an evaluation shall be made to determine the cause of the unacceptable cleanness and the actions required to preclude recurrence.	Added to NQA-1
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). Solution temperatures must be maintained and controlled to assure adequate cleaning and to prevent decomposition and	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. Solution temperatures shall be maintained and controlled to ensure adequate cleaning and to prevent cleaning agent	Similar, but changed from recommendations to requirements in NQA-1.

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possible damage to the system.	decomposition and possible damage to the item.	
2.4 Personnel Qualifications		
Those personnel who perform inspection, examination or testing activities required by this standard shall be qualified in accordance with ANSI N45.2.6 Qualifications of Inspection, Examination, and Testing Personnel for the Construction Phase of Nuclear Power Plants.		Covered in PART 2 INTRO, Basic/Supplementary Requirements 2 of NQA-1, and Section 2 of the QAPD
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 tolerance to determine conformance to specified requirements.		Covered in NQA-1 PART II Introduction, Basic Requirements 2 and 12, and Supplement 12S-1, as well as other sections relating to inspection and test.
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.		Covered in Subpart 2.16 of NQA-1. NQA-1 doesn't generally repeat information that is common between requirements and Subparts.
If no national standards exist, the basis of calibration shall be documented. Records shall be maintained and equipment suitably marked to indicate calibration status.		
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.		
2.6 Housekeeping		
In areas, facilities and environments where the cleanliness 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.		Note – See NQA-1 Subpart 2.3 for comparison with ANSI N45.2.3.
3.0 CRITERIA FOR CLEANING	3 CLEANNESS CRITERIA	

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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. 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.		Note – See NQA-1 Subpart 2.3 for additional information regarding Dominion commitments and clarifications.
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. Internal and external surfaces may have different cleaning and cleanness requirements.		Not a requirement.
3.1 Cleanness Classifications	3.1 Cleanness Classification	
The degree of cleanness required is a function of the particular item under consideration.	The level of cleanness required for any particular application is a function of the particular item under consideration.	Similar
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.	Similar NQA-1 expanded – covers storage, operation, repairs, etc) and with additional specificity.
This standard does not establish the cleanness classification of any specific item. However, typical examples are presented as a guide. The specification for the required cleanness class shall be the responsibility of the purchaser.	Four classes of surface cleanness (Classes A, B, C, and D) with criteria for each are provided in Subpart 2.1.	Four classes defined – see Appendix C of the Dominion QAPD for additional clarifications/alternatives.
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.	Similar
NOTE The following cleanness classifications are not directly	Different cleanness classes may be assigned to internal and	Similar

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related to component classifications assigned by the ASME Boiler and Pressure Vessel Code for design and inspection or for other purposes	external surfaces, or to different parts of the same item based on the cleanliness needs of the specific item. Guidelines for assigning cleanliness classifications are listed in Part III, Subpart 3.2, Appendix 2.1	
	3.2 Cleanliness Class Criteria	
3.1.1 Class A -	3.2.1 Class A.	
A very high level of cleanliness 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. Class A cleanliness applies to special items such as fuel elements, control rod drive mechanisms, delicate instruments, and other close tolerances or carefully controlled surfaces or assemblies. Such items should receive their required level of cleanliness at the point of manufacture and cleanliness must be maintained at the construction site. For these reasons, requirements of this level of cleanliness are considered to be outside of the scope of this document.-:	A very high level of cleanliness 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.	Similar
	Where the cleanliness of internal surfaces is evaluated by flushing, criteria shall be specified in the cleaning procedure.	NQA-1 added requirement.
3.1.2 Class B	3.2.2 Class B.	
A high level of cleanliness applicable to reactor coolant systems, components, and other items, such as the reactor coolant purification system, which have similar cleanliness requirements. Piping and components in systems which are designed as requiring Class B cleanliness shall meet the following requirements	A high level of cleanliness as evidenced by the following characteristics.	Similar
	(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	NQA-1 provides similar guidance as N45.2.1, but breaks it down to Corrosion Resistant Alloys and Carbon and Low Alloy Steels.

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	<p>shall show no evidence of deleterious contamination when subjected to the wipe test of para. 7.2.2 of ASTM A 380-78. 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. Scattered areas of rust are permissible, provided the aggregate area does not exceed 2 sq in. in any 1 sq ft area (14 cm² per 1000 cm²). Temper films and discolorations resulting from welding are acceptable.</p>	
	<p>(2) If flushing is the only practical means for evaluating the cleanness of internal surfaces, a 20mesh (850 μm, 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. 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. There shall be no particles larger than 1/32 in. x 1/16 in. long (0.8 mm x 1.6 mm). In water flushed systems there shall be no visual evidence of contamination (e.g., oil, discoloration) of the effluent flush water or screen.</p>	
<p>NOTE Localized rusting may indicate pitting of the surface and should be evaluated metallurgically. Thin temper films resulting from welding or post-weld heat treatment are acceptable.</p>		
<p>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.</p>		

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2. The surface shall be free of particulate contaminants such as sand, metal chips, weld slag, etc		
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.		
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. 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.		
5. If flushing is the only practical means for determining system cleanliness, the system shall be evaluated by examining a 20-mesh (ASTM E11-70, Specifications for Wire Cloth Sieves for Testing Purposes) or finer filter, or the equivalent, installed on the outlet of the cleaning circuit. 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. 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. There shall be no evidence of organic contamination in the effluent water or on the filter		
	(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	

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	carbon or low alloy steel surface at Class B level). 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. 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).	
	(2) If flushing is the only practical means for evaluating the cleanness of internal surfaces, a 20mesh (850 μm, ASTM E 11, Specification for Wire 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. 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. There shall be no particles larger than 1/32 in. x 1/16 in. long (0.8 mm X 1.6 mm). In water flushed systems there shall be no visual evidence of contamination (e.g., oil, discoloration) of the effluent flush water or screen	
	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.	
3.1.3 Class C -	3.2.3 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:	An intermediate level of cleanness in which the surfaces meet the requirements for Class B except:	Similar – Differences in NQA-1 recognize additional alloys, etc., not recognized in the older N45.2.2 standard.
1. Thin uniform rust films are acceptable on carbon steel surfaces.	(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).	Similar

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2. Scattered areas of rust are permissible provided that the area of rust does not exceed 15 square inches in any 1 square foot on corrosion resistant alloys.	(b) Carbon and low Alloy Steels. A uniform light rust bloom which can be removed by brushing or wiping is acceptable.	Similar
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.	Similar
3.1.4 Class D -	3.2.4 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:	A nominal level of cleanness in which the following are acceptable:	Similar
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;	Similar
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	Similar
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;	Similar
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. The system shall be flushed at its normal velocity until the screen shows no more than occasional particle speckling. 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. There shall be no evidence of organic contamination on the screen; considerable rust-staining is acceptable.	(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 μm, ASTM E 11), or finer filter (or the equivalent).	Similar, but not as specific.
	3.2.5 Summary.	

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	The cleanliness classes are summarized in Table 3.2 of Subpart 2.1. See Table at end of document	
	3.3 Hydraulic, Instrument Control, and Lubrication Lines and Systems	
	The preceding cleanliness classifications and criteria in para. 3.2 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 cleanliness classes. Where special characteristics and specific requirements are needed for such systems, they shall be specified. Guidelines for classifying hydraulic, instrument, and lubrication cleanliness are presented in Part III, Subpart 3.2, Appendix 2.1.	
	3.4 Cleaning and Flushing Fluid Quality Requirements	
3.2 Water Quality Requirements	3.4.1 Water.	
<p>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. 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. When cleaning water quality is not otherwise specified, it shall comply with the following specifications:</p> <p>Reg. Guide 1.37-3/73 Position C.3 states: Subdivision 3.2 of ANSI N45.2.1-1973 states that 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. The water quality for final flushes of fluid systems and associated</p>	<p>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.</p>	<p>Similar. The guidance in the Reg. Guide and the level of detail in the alternative should be addressed in the administrative controls for cleaning.</p>

Cleaning of Fluid Systems and Associated Components During Construction Phase of Nuclear Power Plants ANSI N45.2.1 -1973	Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components for Nuclear Power Plants NQA-1-1994, Subpart 2.1	Comments																												
<p>components should be at least equivalent to the quality of the operating system water.</p> <p>The following is a clarification made in the current VA QATR: (2) With regard to Paragraph C.3 of Regulatory Guide 1.37: The water quality for final flushing of fluid systems and associated components shall be at least equivalent to the quality of the operating system water except for the oxygen and nitrogen content; but this does not infer that chromates or other additives, normally in the system water, will be added to the flush water.</p>																														
<p>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 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 at 25 C (77 F) Less than 3 micro mho/cm Silica Less than 0.05 ppm Turbidity Less than 1-Jackson Turbidity Unit</p>	<p>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.</p> <p style="text-align: center;">TABLE 3.4.1 WATER REQUIREMENTS</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2" style="text-align: center;">Fresh Water [Note (1)] — Minimum Requirements</th> </tr> </thead> <tbody> <tr> <td>pH at 25°C (77°F)</td> <td style="text-align: center;">5.5 to 8.0</td> </tr> <tr> <td>Chloride</td> <td style="text-align: center;">Less than 250 ppm</td> </tr> <tr> <td>Fluoride</td> <td style="text-align: center;">Less than 5 ppm</td> </tr> <tr> <td>Sulfide</td> <td style="text-align: center;">Less than 1 ppm</td> </tr> <tr> <td>Total dissolved solids</td> <td style="text-align: center;">Less than 500 ppm</td> </tr> </tbody> </table> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2" style="text-align: center;">High Quality Water — Minimum Requirements at Point of Entry Into Item</th> </tr> </thead> <tbody> <tr> <td>pH at 25°C (77°F)</td> <td style="text-align: center;">5.5 to 8.0</td> </tr> <tr> <td>Chloride</td> <td style="text-align: center;">Less than 1 ppm</td> </tr> <tr> <td>Fluoride</td> <td style="text-align: center;">Less than 1 ppm</td> </tr> <tr> <td>Sulfide</td> <td style="text-align: center;">Less than 1 ppm</td> </tr> <tr> <td>Conductivity at 25°C (77°F)</td> <td style="text-align: center;">Less than 3 μmho/cm</td> </tr> <tr> <td>Silica</td> <td style="text-align: center;">Less than 0.05 ppm</td> </tr> <tr> <td>Total suspended solids</td> <td style="text-align: center;">Less than 3 ppm</td> </tr> </tbody> </table> <p>NOTE: (1) Potable water that meets U.S. Public Health Service requirements may be utilized for any application where fresh water is specified.</p> <p>Table copied from NQA-1-1994, Subpart 2.1.</p>	Fresh Water [Note (1)] — Minimum Requirements		pH at 25°C (77°F)	5.5 to 8.0	Chloride	Less than 250 ppm	Fluoride	Less than 5 ppm	Sulfide	Less than 1 ppm	Total dissolved solids	Less than 500 ppm	High Quality Water — Minimum Requirements at Point of Entry Into Item		pH at 25°C (77°F)	5.5 to 8.0	Chloride	Less than 1 ppm	Fluoride	Less than 1 ppm	Sulfide	Less than 1 ppm	Conductivity at 25°C (77°F)	Less than 3 μmho/cm	Silica	Less than 0.05 ppm	Total suspended solids	Less than 3 ppm	<p>Similar Table from NQA-1 contains this information.</p>
Fresh Water [Note (1)] — Minimum Requirements																														
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	<p>3.4.2 Gaseous Fluids.</p>																													
	<p>The requirements for gaseous fluids used for flushing are</p>	<p>NQA-1 additional</p>																												

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	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.	requirements/clarifications.																																																													
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	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 meet the particulate contamination limits specified in Table 3.4.4 for the system class specified.	NQA-1 additional requirements/clarifications.																																																													
	<p style="text-align: center;">TABLE 3.4.4 FLUSHING REQUIREMENTS FOR HYDRAULIC, INSTRUMENT CONTROL, AND LUBRICATION SYSTEMS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">System Class</th> <th rowspan="2">Generic Description</th> <th colspan="5">Maximum Number of Particles per 100 cc Particle Size</th> </tr> <tr> <th>5-10 μm</th> <th>10-25 μm</th> <th>25-50 μm</th> <th>50-100 μm</th> <th>100 μm</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Super clean</td> <td>2,700</td> <td>670</td> <td>93</td> <td>16</td> <td>1</td> </tr> <tr> <td>1</td> <td>MIL-H-5606B</td> <td>4,600</td> <td>1,340</td> <td>210</td> <td>28</td> <td>3</td> </tr> <tr> <td>2</td> <td>High reliability</td> <td>9,700</td> <td>2,680</td> <td>380</td> <td>56</td> <td>5</td> </tr> <tr> <td>3</td> <td>Critical</td> <td>24,000</td> <td>5,360</td> <td>780</td> <td>110</td> <td>11</td> </tr> <tr> <td>4</td> <td>Less critical</td> <td>32,000</td> <td>10,700</td> <td>1,510</td> <td>225</td> <td>21</td> </tr> <tr> <td>5</td> <td>Moderate reliability</td> <td>97,000</td> <td>21,400</td> <td>3,130</td> <td>430</td> <td>41</td> </tr> <tr> <td>6</td> <td>Industrial</td> <td>128,000</td> <td>24,000</td> <td>6,500</td> <td>1,000</td> <td>92</td> </tr> </tbody> </table> <p>GENERAL NOTES: (a) Adapted from ASTM STP 491, Maintenance of Cleanliness of Hydraulic Fluids and Systems. Classes 2 and 5 of the table in STP 491 are described as Good Missile and Poor Missile, respectively. While these criteria are based on a specified volume of liquid (100 cc), they can also be applied to gaseous flushes. When used in this manner, the cleaning procedure shall specify the flushing velocity and time upon which the evaluation shall be based. (b) The above system Class designations do not directly correspond to the cleanliness class criteria classes of Subpart 2.1.</p>	System Class	Generic Description	Maximum Number of Particles per 100 cc Particle Size					5-10 μm	10-25 μm	25-50 μm	50-100 μm	100 μm	0	Super clean	2,700	670	93	16	1	1	MIL-H-5606B	4,600	1,340	210	28	3	2	High reliability	9,700	2,680	380	56	5	3	Critical	24,000	5,360	780	110	11	4	Less critical	32,000	10,700	1,510	225	21	5	Moderate reliability	97,000	21,400	3,130	430	41	6	Industrial	128,000	24,000	6,500	1,000	92	
System Class	Generic Description			Maximum Number of Particles per 100 cc Particle Size																																																											
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	3.4.5 If acid cleaning is used, particular attention shall be given	NQA-1 additional																																																													

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	to: (a) avoidance of entrapment of acids in crevices; (b) effects on either welded or sensitized corrosion-resistant alloys and nonferrous materials; (c) complete removal of any residual acid solution from the item; (d) neutralization treatment followed by thorough rinsing or flushing.	requirements/clarifications.
	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.	NQA-1 additional requirements/clarifications.
	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.	New section for manufacturing phase, contains similar requirements to installation phase.
	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	

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	<p>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 component is assembled, unless the component is readily cleanable in its final assembled state.</p>	
	<p>(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. Paint, chalk, scribing inks, and other temporary marking materials shall be removed from the affected surfaces prior to heat treatment or welding.</p>	
	<p>(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.</p>	
	<p>(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,</p>	

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	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.	
4.0 PRE-INSTALLATION CLEANNESS	5 CLEANNESS PRIOR TO INSTALLATION	
Items should not be delivered to the point of installation site sooner than necessary unless the installation location is considered a better storage area. Inspections, examinations, and tests as appropriate shall be performed immediately prior to installation to determine the cleanliness of the item. If contaminants are detected, they shall be removed if it is judged that they will not be removed in subsequent cleaning operations. 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. Unless otherwise required by the job specifications, the temporary coatings shall be removed prior to installation of items.	From a cleanliness 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)]. Inspections and tests, as appropriate, shall be made immediately prior to installation to determine the cleanliness of the item. If potentially harmful contaminants are detected, they shall be removed if they will not be removed in subsequent cleaning operations. 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. Unless otherwise required by the job specifications, the temporary coatings shall be removed prior to installation of items.	Similar
5.0 INSTALLATION CLEANING	6 CLEANNESS DURING INSTALLATION	
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. Local cleanup of contaminated areas is recommended as installation progresses, rather than one cleanup operation when installation is completed. Reg. Guide 1.37-3/73 Position C.5 states: Section 5 of ANSI	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. Cleanup of locally contaminated areas as installation progresses is recommended (rather than one cleanup operation when installation is completed).	Similar

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<p>N45.2.1 1973 states, in part, that operations such as grinding and welding which generate particulate matter should be controlled. Adequate control of tools used in abrasive work operations such as grinding, sanding, chipping, or wire brushing should be provided. Specifically, tools which contain materials that could contribute to intergranular cracking or stress-corrosion cracking or which, because of previous usage, may have become contaminated with such materials should not be used on surfaces of corrosion-resistant alloys. Examples of such materials are listed in Regulatory position 4. 6. Subdivision 1.4 of ANSI N45.2.1-1973 suggests the use of ASTM A 262-68 or ASTM A 393-63 for detection of intergranular precipitation of chromium carbides in corrosion-resistant alloys. ASTM A 393-63 has been withdrawn by ASTM and is no longer considered a valid test.</p>		
<p>Consideration should be given to sequencing installation and erection operations, when practical, to facilitate cleaning and cleanliness control. 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.</p>	<p>Consideration shall be given to sequencing of installation and erection operations to facilitate cleaning, cleanliness control, and inspection. 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.</p>	<p>Similar</p>
<p>Openings and pipe ends shall be sealed at all times except when they must be unsealed to carry out necessary operations. Fitted and tack-welded joints (which will not be immediately sealed by welding) shall be wrapped with polyethylene or other nonhalogenated plastic film until the welds can be completed.</p>	<p>Openings and pipe ends shall be sealed at all times except when they must be unsealed to carry out necessary operations.</p>	<p>Similar</p>
<p>Precautions shall be taken to avoid contamination of crevices, blind holes, dead legs, undrainable cavities, and inaccessible 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..</p>	<p>Precautions shall be taken to avoid contamination of crevices, blind holes, dead legs, undrainable cavities, and 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.</p>	<p>Similar</p>
<p>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</p>	<p>The use of cleaning methods and materials, cutting fluids, lubricants, liquid penetrants, marking materials, precleaning solutions, engineering test fluids, tools, and other materials and</p>	<p>Similar The level of detail in the alternative should be</p>

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<p>of corrosion resistant alloys. 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 nickelbase alloys. Paints, chalk and other temporary marking materials shall be removed by solvent-wiping or mechanical means.</p> <p>Reg. Guide 1.37-3/73 Position C.4 states: Section 5 of ANSI N45.2.1-1973 states, in part, that low sulfur, low fluorine, and/or low chlorine compounds may be used on austenitic stainless steels and that low sulfur and low lead compounds may be used on nickel-base alloys. Chemical compounds that could contribute to intergranular cracking or stress-corrosion cracking should not be used with austenitic stainless steel and nickel-base alloys. Examples of such chemical compounds are those containing chlorides, fluorides, lead, zinc, copper, sulfur, or mercury where such elements are leachable or where they could be released by breakdown of the compounds under expected environmental conditions (e.g., by radiation). This limitation is not intended to prohibit the use of trichlorotrifluoroethane which meets the requirements of Military Specification Mil-C-81302b for cleaning or degreasing of austenitic stainless steel provided the precautions of subdivision 7.3(4) of ANSI N45.2.1-1973 are observed.</p> <p>The following is a clarification made in the current VA QATR: (3) With regard to Paragraph C.4 of Regulatory Guide 1.37: Expendable materials such as inks and related products, temperature indicating stick, tapes, gummed labels, wrapping materials (other than polyethylene), water soluble dam materials, lubricants, NDE penetrant materials and couplants, desiccants, and like materials which contact stainless steel or nickel alloy surfaces; shall not contain lead, zinc, copper, mercury, cadmium and other low melting point metals, their alloys or compounds as basic and essential chemical constituents. No more than 0.1 percent (1000 ppm) halogens will be allowed where such elements are leachable or where they could be released by breakdown of the compounds under expected environmental</p>	<p>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 Section 4.</p>	<p>contained in the implementing procedures and is within the requirements of the NQA-1 standard.</p>

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conditions.		
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.	Similar
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. 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.	The use of mineral acids and organic acids to clean austenitic stainless steel and nickel alloys shall be evaluated and approved prior to use. 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.	Similar
Local rusting on corrosion resistant alloys should be removed by mechanical methods. The following is a clarification made in the current VA QATR: (4) With regard to Section 5 of ANSI N45.2.1-1973, titled Installation Cleaning : The recommendation that local rusting on corrosion resistant alloys be removed by mechanical methods is interpreted to mean that local rusting may be removed mechanically, but the use of other removal means is not precluded as determined by Engineering.		This guidance not contained in NQA-1. Alternative no longer required since cleaning is to be as specified.
Large openings, such as the open reactor vessel shall be protected against falling and windblown contaminants.	Large openings, such as the open reactor vessel, shall be protected against falling and windblown contaminants.	Similar requirement.
6.0 MAINTENANCE OF INSTALLATION CLEANNESS	7 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. Access control shall be established to exclude personnel and contaminants. Where environmental contamination could cause degradation of quality, seals must be installed which must be hermetically tight and difficult to remove	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. Where environmental contamination could cause degradation of quality, seals shall be installed to prevent contamination of interior surfaces. 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. Seals shall be installed in a manner to prevent accidental removal.	Similar
Gasketed metal seals with welded metal strap closures, or seal	Removal shall be only with proper authorization. If access to	Similar

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<p>welded metal caps are recommended for Class B systems and components. Items in this condition shall be tagged with identifications and instructions for seal removal. If access to a sealed system is required, precautions shall be taken to prevent introduction of contaminants. Prior to opening the seals, the immediate surroundings should be cleaned to remove solid contaminants which might be introduced in the system. Personnel entering the system should wear clean outer clothing and shoe covers. When the necessary work is completed, the interior surface shall be locally cleaned to its original condition and the system should be resealed.</p>	<p>such sealed items is required, precautions shall be taken to prevent introduction of contaminants. Such precautions include masking and tenting of surrounding areas with plastic film or tape, cleanup of the immediate surroundings to remove particulate matter that can be introduced into the opening, requiring personnel to wear clean outer clothing and shoe covers, etc. Control of tools, loose items, and access shall be maintained in accordance with applicable requirements. When the necessary work is completed, the interior surface shall be locally cleaned, if necessary, to its original condition and the item resealed.</p>	
7.0 PRE-OPERATIONAL CLEANING	8 PREOPERATIONAL CLEANING	
7.1 Preparations	8.1 Preparations	
<p>Cleaning and flushing operations shall be scheduled so as to minimize interference from other plant operations. 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.</p>	<p>Insofar as practicable, cleaning and flushing operations shall be scheduled so as to minimize interference from other plant operations. 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.</p>	<p>Similar</p>
<p>Personnel shall be familiarized with the intended procedure and associated hazards. 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.</p>	<p>Personnel shall be familiarized with the intended procedure and associated hazards. 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.</p>	<p>Same</p>
<p>Loose tools should be attached to either the workman or the exterior of the system with a lanyard. The actual circulating flow path shall be checked for agreement with specified requirements in regard to location, position and Status of all components.</p>	<p>Tools and other loose items in controlled areas shall be controlled as specified in Section 7. The actual circulating flow path shall be checked for agreement with specified requirements with regard to location, position, and status of all components.</p>	<p>Similar</p>
<p>Critical valves, controls and switches shall be tagged to prevent inadvertent actuation during the cleaning operation. 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. Demineralizers, filters,</p>	<p>Critical valves, controls, and switches shall be tagged to prevent inadvertent actuation during the cleaning operation. 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. Demineralizers, filters,</p>	<p>Similar</p>

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instruments, valve internals and other items that may be damaged by the cleaning process shall be blanked off, bypassed or removed.	instruments, valve internals, and other items that may be damaged by the cleaning process shall be blanked off, bypassed, or removed.	
Protective screens shall be installed on the suction side of all pumps and 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. All other permanently installed instrumentation shall be isolated where possible.	Protective screens shall be installed on the suction side of all pumps and other components that may be subject to damage during the cleaning operations. Instrumentation (e.g., pressure, differential pressure temperature, and flow) shall be used as necessary to monitor flushing and recirculatory cleaning operations. Instrumentation installed in the system but not used to monitor the cleaning operations shall be isolated where necessary.	Similar
Cleaning should be completed before installation of fuel, reactor vessel internals and control rods. 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. Procedures used to protect installed components which are not used in the cleaning operations but which are included in the cleaning circuit should be reviewed.	Cleaning of the reactor vessel and reactor vessel internals shall be completed before installation of fuel and control rods. 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. Procedures shall be established to protect or isolate installed components that could be adversely affected by cleaning or flushing operations.	Similar
7.2 Flushing and Cleaning Methods	8.2 Flushing and Cleaning Methods	
7.2.1 Water Flushing..	8.2.1 Flushing.	
If the intended level of cleanness has been maintained during erection of the plant, only water flushing will be required. The system shall be filled with water of the quality specified and flushed in accordance with approved procedures. Completion of flushing shall be determined by filter, turbidimetric or chemical analyses	If the intended level of cleanness has been maintained during erection of the plant, only flushing or rinsing will normally be required. The system shall be filled with fluid of the type and quality specified and flushed in accordance with approved procedures. Completion of flushing shall be determined by filter, turbidimetric or chemical analysis, or any combination of these, as applicable.	Similar
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	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. Provisions shall be made to assure that organics do	Similar

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<p>effluent from the system. At this time, high velocity flushes may be made toward the reactor vessel. 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 particulate contaminants at some accessible location within the reactor vessel by filtration or other technique.</p>	<p>not remain on the surfaces.</p>	
<p>After system flushing is completed, but before system drain, all pockets and dead legs shall be flushed through their drain connections. If conditioned water is used, particular attention should be given to assure that large volumes of solution do not remain trapped in the system. Care shall be taken to assure that organics do not remain on the surfaces.</p>	<p>After system flushing is completed, but before draining, all pockets and dead legs shall be thoroughly flushed. Where conditioned water is used, particular attention should be given to assure that large volumes of solvent do not remain trapped in the system.</p>	<p>Similar</p>
<p>A final flush with demineralized water is desirable but is not necessarily required at this time. The system shall be sealed to prevent the subsequent entry of contamination. If no further cleaning is required, system layup may be performed.</p>	<p>After cleaning, the item shall be sealed where appropriate to prevent the subsequent entry of contaminants. If no further cleaning is required, system lay-up shall be performed if specified.</p>	<p>Similar</p>
<p>7.2.2 Alkaline Cleaning.</p>	<p>8.2.2 Alkaline Cleaning.</p>	
<p>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. One relatively common source of organic contamination in piping systems is lubricating oils from air tools. 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.</p>	<p>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. Common sources of organic contamination in items are lubrication oils from air tools, preservative films, and valve lubricants. When immediate local cleanup is not performed, full item cleaning to remove such organic contaminants may be necessary.</p>	<p>Similar</p>
<p>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.</p>	<p>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.</p>	<p>Similar</p>
<p>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.</p>	<p>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</p>	<p>Similar</p>

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	specified cleanliness level.	
<p>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. 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.</p>	<p>After item cleaning is completed, the item shall be flushed with water of the specified quality to remove the cleaning agents. In particular, all pockets and dead legs shall be flushed and attention given to assure that large volumes of solution do not remain.</p>	<p>Similar</p>
<p>The system should be sealed to prevent the subsequent entry of contamination. If no further cleaning is required, system layup may be performed. Precautions related to the use of alkaline cleaning solutions are listed in paragraph 7.3.</p>	<p>Where appropriate, the item shall be sealed to prevent subsequent contamination. If no further cleaning is required, system lay-up shall be performed, if specified. Precautions related to the use of alkaline cleaning solutions are listed in Part III, Subpart 3.2, Appendix 2.1.</p>	<p>Similar</p>
<p>7.2.3 Chelate Cleaning.</p>	<p>8.2.3 Chelate Cleaning.</p>	
<p>Chelate cleaning of carbon or low-alloy steel surfaces to remove light corrosion product films is not a required cleaning operation. If chelating cleaning is used, flushing with water of a quality consistent with the system requirements should be performed to remove the chelating agents. 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.</p>	<p>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. 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.</p>	<p>Similar, but changed from recommendations to requirements of NQA-1 where determined to be appropriate.</p>
<p>The system should be sealed to prevent the subsequent entry of contaminants. If no further cleaning is required, layup may be performed. Precautions related to the use of chelating agents are listed in paragraph 7.3.</p>	<p>Where appropriate, items shall be sealed to prevent subsequent contamination. If no further cleaning is required, lay-up shall be performed, if specified. Precautions related to the use of chelating agents are listed in Part III, Subpart 3.2, Appendix 2.1.</p>	<p>Similar, but changed from recommendations to requirements of NQA-1 where determined to be appropriate.</p>
<p>7.3 Cleaning Precautions</p>		
<p>There are a number of precautions that should be observed during cleaning operations. The following should be considered as appropriate.</p>		<p>Recommendations, not requirements.</p>
<p>1. The addition of a suitable chloride stress cracking inhibitor is recommended if fresh water flushing of systems containing austenitic stainless steels is planned.</p>		
<p>2. The use of alkaline cleaning compounds which contain free</p>		

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caustic is not recommended on components or systems in which cleaning solutions may be entrapped. Cleaners based on compounds which produce hydroxyl ions by hydrolysis, such as trisodium phosphate, are recommended. If heavy organic solids are present, the addition of an emulsifier and a wetting agent may be considered.		
3. The use of acid-chelating agents on welded or furnace sensitized stainless steels and nickel base alloys is not recommended.		
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.		
5. Acid cleaning of installed systems is not recommended. However, if used, particular attention shall be given to:		
(a) Avoiding the entrapment of acids in the crevices.		
(b) Avoiding contact with either welded or furnace sensitized corrosion resistant alloys, and non-ferrous materials.		
(c) Complete removal of any residual acid solution from the system.		
(d) Neutralization treatment as a final operation.		
8.0 LAYUP AND POST-LAYUP CLEANING	9 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.	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 lay-up 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.	Similar
8.2 Prior to the next series of operations or tests residual cleaning solutions or layup chemicals shall be removed from	Prior to the next series of operations or tests, residual cleaning solutions or lay-up media shall be removed, if required, from	Similar

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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.	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.	
	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 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.	New requirements to address operations phase activities.
	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 lay-up is deemed necessary, it shall be performed in accordance with Section 9.	
9.0 RECORDS	11 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.	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.	Similar
These shall be placed with 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.	These records shall be retained with other project records as required by code, standard, specification, or project procedures.	Similar

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10.0 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.		Commitment to specific standards will be controlled through compliance with the regulations regarding QA programs.
N45.2 Quality Assurance Program Requirements for Nuclear Power Plants N45.2.3 Housekeeping During the Construction Phase of Nuclear Power Plants 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 (will) be available in 1973		

TABLE 3.2
SUMMARY TABLE FOR CLEANNESS CLASSES

Class	Surface Appearance	Rust	Paints or Preservatives	Mill Scale	Flushing Criteria
Class A Corrosion-resistant alloys	Metal clean	NR	NR	NR	Specified in cleaning procedure
Carbon and low alloy steels [Note (1)]	Metal clean	NR	No paints; preservative if specified	NR	Specified in cleaning procedure
Class B Corrosion-resistant alloys	Metal clean, but with temper films	2 sq in./1 sq ft (Scattered) (14 cm ² /1000 cm ²)	NR	NR	No particles larger than 1/32 in. × 1/16 in. (0.8 mm × 1.6 mm)
Carbon and low alloy steels [Note (1)]	Metal clean, but with temper films	2 sq in./1 sq ft (Scattered) (14 cm ² /1000 cm ²)	No paints; preservative if specified	NR	No particles larger than 1/32 in. × 1/16 in. (0.8 mm × 1.6 mm)
Class C Corrosion-resistant alloys	Metal clean, but with temper films	15 sq in./1 sq ft (Scattered) (100 cm ² /1000 cm ²)	NR	NR	No particles larger than 1/32 in. × 1/16 in. (0.8 mm × 1.6 mm)
Carbon and low alloy steels	No visible particles	Uniform soft film	No paints; preservative if specified	NR	No particles larger than 1/32 in. × 1/16 in. (0.8 mm × 1.6 mm)
Class D Corrosion-resistant alloys	NR (unless specified by purchaser)	NR	NR	NR	No particles larger than 1/16 in. × 1/8 in. (1.6 mm × 3.2 mm)
Carbon and low alloy steels	NR (unless specified by purchaser)	NR	Acceptable	Acceptable if adherent	No particles larger than 1/16 in. × 1/8 in. (1.6 mm × 3.2 mm)

NR = no requirement

NOTE:

(1) While Class A and B cleanliness levels can be achieved on carbon and low alloy steel surfaces, maintenance of these levels is very difficult. Assignment of Class A and B levels to such surfaces should be made with discretion.

SUBPART 2.1

ASME NQA-1 1994 EDITION ** 0759670 0541632 979

ASME NQA-1-1994 EDITION

Packaging, Shipping, Receiving, Storage And Handling Of Items For Nuclear Power Plants (During The Construction Phase) N45.2.2	Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Nuclear Power Plants NQA-1 1994 Subpart 2.2	Comments
1. INTRODUCTION	1 GENERAL	
1.1 Scope		
<p>This standard defines requirements for packaging, shipping, receiving, storage, and handling of nuclear power plant items. 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. 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.</p> <p>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.</p> <p>NRC Regulatory Guide 1.38</p> <p>Regulatory Position C.1. The requirements for the packaging, shipping, receiving, storage, and handling of items for water-cooled nuclear power plants that are included in ANSI N45.2.2-1972, "Packaging, Shipping, Receiving, Storage, and Handling of Items for Nuclear Power Plants During the Construction Phase,"(2) are acceptable to the NRC staff and, when supplemented by the guidelines identified in Regulatory Position 2, provide an adequate basis for complying with the pertinent quality assurance requirements of Appendix B to 10 CFR Part 50, subject to the following:</p> <p>d. Although ANSI N45.2.2-1972 is entitled "Packaging, Shipping, Receiving, Storage, and Handling of Items for Nuclear Power Plants During the Construction Phase," the requirements included in the standard are considered to be applicable during the operation phase and should be used, where applicable, consistent with the recommendations of this regulatory guide.</p>	<p>Subpart 2.2 provides amplified requirements for packaging, shipping, receiving, storage, and handling of nuclear power plant items. 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.</p>	<p>Similar requirement. NRC position is that the ANSI standard applies to the operations phase in addition to construction. NQA-1 makes this Subpart applicable to all phases of the facility's life, from siting and design through decommissioning.</p>

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1.2 Applicability		
<p>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. 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. 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.</p> <p>The following is an Exception made in the current MP QATR: <u>ANSI N45.2.2 - 1972</u>, paragraph 1.2, states in part that, "The requirements of this standard apply to the work of <u>any</u> individual or organization that participates in the packaging, shipping, receiving, storage, and handling of items to be incorporated into nuclear power plants." Since a portion of the licensee procurement activities involve commercial suppliers which do not fully comply with the requirements of ANSI N45.2.2, the licensee's Supply Chain Management organization verifies through source inspections, receipt inspection, and/or survey activities that the quality of the materials, items, components or equipment is preserved by those suppliers to the extent that packaging, shipping, storage and handling methods are employed which are commensurate with the nature of the product.</p>	See NQA-1-1994 Part II Introduction for Applicability.	Similar requirements. Alternative not needed under the proposed program.
1.3 Responsibility		
<p>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 work of establishing practices and procedures and providing the resources in terms of personnel, equipment and services necessary to implement the</p>	See NQA-1-1994 Part II Responsibility for Applicability.	Similar requirements.

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requirements of this standard may be delegated to other organizations and such delegation also shall be documented. 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.		
The following shall be used as a guide in determining those responsibilities which shall be established and documented: 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		Guidance in NQA-1 is not as specific to this subpart.
1.4 Definitions	1.1 Definitions	
The following definitions are provided to assure a uniform understanding of select terms as they are used in this standard.	The following definitions are provided to assure a uniform understanding of unique terms as they are used in Subpart 2.2.	See NQA-1, Part I Introduction for additional definitions
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	Same
Carrier - The transporting agency.	carrier - the transporting agency	Same
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.	Similar
Documentation - Any written or pictorial information describing, defining, specifying, reporting, or certifying activities, requirements, procedures or results.	Definition in Part I is similar in wording.	Similar
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	Similar
Handling - The act of physically moving items by hand or by	See Subpart 2.15 for this definition. 2.15 limits the term to use	All of the handling information

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mechanical machinery, not including transport modes.	of equipment for handling.	from this standard has been added to Subpart 2.15.
Item - Any level of unit assembly, including system, subsystem, subassembly, component, part, or material.	Definition in Part I is similar in wording.	Similar
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.	Definition in Part I is similar in wording.	Similar
Package - The shipping container plus the contents of the container.		Not defined 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.		Not defined in NQA-1
Receiving - To take delivery of material at the construction site or other location designated by the purchaser.	Definition in Part I is similar in wording.	Similar
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	Similar
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	Similar
Transit Carrier (Open) - Trucks, Trailers, Railroad cars, Barges, Aircraft, or Ships which do not provide protection of items from the environment.		Not defined 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.		Not defined in NQA-1
Transportation Mode - A method identified by the conveyance used for transportation of items and includes any motor vehicles, ships, railroad cars, or aircraft. Each cargo-carrying body (trailer, van, box car, etc.) is a separate vehicle.	transportation mode - a method identified by the conveyance used for 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.	Similar
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	Same
Other terms and their definitions are contained in ANSI	Not stated in this subpart, but note that other definitions are	

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N45.2.10.	contained in Part I, Introduction and other Subparts.	
1.5 Referenced Documents		
<p>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. 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.</p> <p>NRC Regulatory Guide 1.38 Regulatory Position C.1.a. Subdivision 1.5 of ANSI N45.2.2-1972 states that other documents required to be included as a part of this standard are either identified at the point of reference or described in Section 9 of the standard. The specific acceptability of these listed documents has been or will be covered separately in other regulatory guides or in Commission regulations where appropriate.</p>		Other documents and standards are addressed in the new QA program, Appendix C.
2. GENERAL REQUIREMENTS	2 GENERAL REQUIREMENTS	
<p>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.</p> <p>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.</p>	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.	Similar
2.1 Planning	2.1 Planning and Procedures	
<p>The specific items to be governed by this standard shall be identified. Planning shall take into account the need for the preparation and control of procedures and work instructions as necessary to comply with specified requirements. 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.</p> <p>Clarification from the current VA QATR:</p>	Planning and procedure preparation shall be in accordance with the requirements of the introduction to this Part (Part II).	Similar requirements in the referenced section of NQA-1. Clarification not needed under the proposed program.

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Planning: (First sentence.) The specific items to be governed by the Standard shall be identified in Administrative Procedures.		
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.	See NQA-1-1994 Part II Introduction for Procedures.	Similar requirements in the referenced section of NQA-1.
2.3 Results		
<p>Inspection and test results shall be documented in a suitable test report or data sheet.</p> <p>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:</p> <p>(1) Conditions encountered which were not anticipated, including nonconformance.</p> <p>(2) Identity of inspector or tester.</p> <p>(3) Completion date.</p> <p>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.</p> <p>Clarification from the current VA QATR:</p> <p>(2) With regard to Section 2.3 of ANSI N45.2.2-1972, titled Results: The specific methods for performing and documenting tests and inspections are given in Sections 17.2.10 and 17.2.11 of the Operational QA Program. The requirements in these Sections will be implemented in lieu of the general requirements here.</p>		Documentation of inspection and test results is addressed in Part I of NQA-1, Basic Requirements 10 and 11. Clarification not needed under the proposed program.
2.4 Personnel Qualifications		
Those personnel who perform inspection, examination or testing activities at the job site shall be qualified in accordance with N45.2.6. Off-site inspection, examination or testing shall be audited and monitored by personnel who are qualified in accordance with N45.2.6.		Qualification is covered by NQA-1, Part I, Supplement 2S-1, and Part III, Appendix 2A-1.

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2.5 Measuring and Test Equipment		M&TE is covered by NQA-1 Part I, Requirement 12, and Part II, Subpart 2.16, and contain similar requirements to N45.2.2.
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.		
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. If no national standards exists, the basis for calibration shall be documented. Records shall be maintained and equipment 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.		Housekeeping is covered by NQA-1, Part II, Subpart 2.3
2.7 Classification of Items	2.2 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. Clarification from the current VA QATR: (3) With regard to Section 2.7 of ANSI N45.2.2-1972, titled Clarification of Items : The Company may choose not to	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.	Similar requirements. Clarification not needed under the proposed program.

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explicitly use the four level classification system. However, the specific requirements of the Standard that are appropriate to each class are applied to the items suggested in each classification and to similar items as determined by station management.		
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. 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. 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 contractor.	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. 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. 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.	Similar
The manufacturer's documented standard or minimum requirements shall be considered when classifying the items. Items, once classified, shall be restricted to the level or higher for each of the packaging, shipping, receiving, storage and handling operations. 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. 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. If the unit is disassembled, a level shall be indicated for each part. When the unit cannot be physically disassembled, special rules are contained herein.	The manufacturer's documented standard or minimum requirements shall be considered when classifying the items. 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. 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. If the unit is disassembled, a level shall be indicated for each part.	Similar
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.	Similar
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:	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:	Similar
temperatures outside required limits,	(a) temperatures outside required limits	Similar
sudden temperature changes,	(b) sudden temperature changes	Similar

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humidity and vapors,	(c) humidity and vapors	Similar
gravitational (g) forces,	(d) accelerating forces	Similar
physical damage	(e) physical damage	Similar
and airborne contamination (e.g. rain, snow, dust, dirt, salt spray, fumes).	(f) airborne contamination (e.g., rain, snow, dust, dirt, salt spray, fumes)	Similar
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:	Similar
(1) Special electronic equipment and instrumentation.	(a) special electronic equipment and instrumentation	Similar
(2) Special materials, such as chemicals that are sensitive to environment.	(b) special materials, such as chemicals, that are sensitive to environment	Similar
(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.	Similar
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 extreme, 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.	Similar
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	Similar
(1) Instrumentation	(a) instrumentation	Similar
(2) Electrical penetrations	(b) electrical penetrations	Similar
(3) Batteries	(c) batteries	Similar
(4) Welding electrode and wire	(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.)	NQA-1 added clarifying information in parentheses.
(5) Control rod drives	(e) control rod drives	Similar
(6) Motor control centers, switchgear and control panels	(f) motor control centers, switchgear, and control panels	Similar
(7) Motors and generators	(g) motors and generators	Similar
(8) Precision machined parts	(h) precision machine parts	Similar
(9) Erection spares, such as gaskets, "O" rings	(i) spares, such as gaskets, O-rings	Similar
(10) Air handling filters	(j) air handling filters	Similar

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(11) Computers	(k) computers	Similar
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.	Similar
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	Similar
(1) Pumps	(a) pumps	Similar
(2) Valves	(b) valves	Similar
(3) Fluid filters	(c) fluid filters	Similar
(4) Reactor internals	(d) reactor internals	Similar
(5) Compressors	(e) compressors	Similar
(6) Auxiliary Turbines	(f) auxiliary turbines	Similar
(7) Instrument cable	(g) instrument cable (unjacketed)	NQA-1 adds unjacketed.
(8) Refueling equipment	(h) refueling equipment	Similar
(9) Thermal insulation	(i) thermal insulation	Similar
(10) Fans and blowers	(j) fans and blowers	Similar
(11) Cement	(k) cement	Similar
	(l) fabricated fuel rods and assemblies	Added in NQA-1-1994.
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 airborne 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.	Similar
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:	Similar
(1) Tanks	(a) tanks	Similar
(2) Heat exchangers and parts	(b) heat exchangers and parts	Similar
(3) Accumulators	(c) accumulators	Similar
(4) Demineralizers	(d) demineralizers	Similar
(5) Reactor vessel	(e) reactor vessel	Similar
(6) Evaporators	(f) evaporators	Similar
(7) Steam generators	(g) steam generators	Similar
(8) Pressurizer	(h) pressurizers	Similar

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(9) Piping	(i) piping	Similar
(10) Electrical cable	(j) electrical cable (jacketed)	NQA-1 adds jacketed.
(11) Structural items	(k) structural items	Similar
(12) Reinforcing steel	(l) reinforcing steel.	Similar
(13) Aggregates	(m) aggregates	Similar
3. PACKAGING	3 PACKAGING	
3.1 General	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. The degree of protection specified will vary according to storage conditions and duration, shipping environment, and handling conditions.	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. The degree of protection specified will vary according to conditions and duration of storage, shipping environment, and handling conditions.	Similar statements.
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.	Similar statements.
Appendix A-3 contains additional requirements generally not available in other documents. These requirements are a mandatory part of this standard. 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". NOTE: *The paragraph numbers contained herein are not sequential but correspond to the respective paragraph of section 3 of this standard where they are referenced.	Note: NQA-1 places the equivalent information from N45.2.2, Appendix within the text section and doesn't use an Appendix. To provide consistent comparison, Appendix A-3 information in the N45.2.2 column is placed in order of the paragraphs similar to the layout of NQA-1. Those sections in the N45.2.2 column starting with an A are the Appendix paragraphs.	Wording from N45.2.2 regarding additional requirements found in Appendix.
3.2 Levels of Packaging	3.2 Levels of Packaging	
The packaging requirements are based on the protection the items should receive during shipping, handling, and storage. The	The packaging requirements shall be based on the protection that is necessary during shipping, handling, and storage of the	Similar

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requirements of this standard are intended to be in addition to industry classification 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.	item to satisfy Levels A, B, C, and D protection requirements set forth below. 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.	
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	Similar
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	Similar
(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.	Similar
(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.	Similar
(3) Items which are not immediately packaged shall be protected from contamination.	(c) Items which are not immediately packaged shall be protected from contamination	Similar
(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).	Similar
(5) Items shall be packaged in containers of 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).	Similar
(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).	Similar
(7) All openings into items shall be capped, plugged or sealed	(g) All openings into items shall be capped, plugged, or sealed	Similar

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(See Subsection 3.5 of this Standard). Weld end preparations shall be protected against corrosion and physical damage.	(see para. 3.5). Weld end preparations shall be protected against corrosion and physical damage	
(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.	Similar
(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).	Similar
<p>Clarification from the current VA QATR: (4) With regard to Section 3.2.1 of ANSI N45.2.2-1972, titled Level A Items: As an alternate to the requirements for packaging and containerizing items in storage to control contaminants (Items (4) and (5)), the Company may choose a storage atmosphere which is free of harmful contaminants in concentrations that could produce damage to stored items as determined by station management. Similarly (for Item (7)) the Company may obviate the need for caps and plugs, as determined by station management, with an appropriate storage atmosphere, and may choose to protect weld-end preparations and threads by controlling the manner in which the items are stored. These clarifications apply whenever items (4), (5) or (7) are subsequently referenced and to Section 3.5.1, titled Caps and Plugs, and Section 3.4, titled Methods of Preservation.</p>		Similar A similar alternative proposed as part of the new QAPD.
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.	Similar
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.	Similar
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	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	Similar

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vehicle and Level B storage facilities are available at the site.	through to destination in the original vehicle and Level B storage facilities are available on site. If transfer becomes necessary to transit, transfer procedures shall be subject to purchaser acceptance.	
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 vapor and condensation is less important than for Level B items.	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 condensation is less important than for Level B items.	Similar
The following criteria shall apply:	The following criteria shall apply.	Similar
(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.	Similar
(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. Clarification from the current VA QATR: (5) With regard to Section 3.2.3 of ANSI N45.2.2 1972, titled Level C Items : (Subpart 2) states “Items shall be packaged with a waterproof enclosure...,” as an alternative, the company may choose appropriate packaging when the storage environment prevents harmful contaminants in concentrations that could produce damage to stored items as determined by Station mgmt.	(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..	Similar A similar alternative proposed as part of the new QAPD.
(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	Similar
3.2.4 Level D Items. (See paragraph 2.7.4) Level D items require protection from physical and mechanical damage.	3.2.4 Level D Items. (See para. 2.2.4.) Level D items require protection from physical and mechanical damage.	Similar
The following criteria shall apply:	The following criteria shall apply	Similar
(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.	Similar
(2) All openings into items shall be capped, plugged and sealed	(b) All openings into items shall be capped, plugged, and sealed	Similar

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(See Subsection 3.5 of this Standard). Weld end preparations shall be protected from corrosion and physical damage.	(see para. 3.5). Weld end preparations shall be protected from corrosion and physical damage.	
(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.	Similar
(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).	Similar
(5) Items such as aggregate and reinforcing steel shall be suitably protected against detrimental contamination or corrosion.		Addressed in NQA-1, Part II, Subpart 2.5.
(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.	Similar
3.3 Cleaning	3.3 Cleaning	
<p>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. Any item which is not immediately packaged shall be protected from further contamination. (See Appendix section A3.3 for additional requirements.)</p> <p>Clarification from the current VA QATR: (6) With regard to Section 3.3 of ANSI N45.2.2-1972, titled Cleaning: (Third sentence) the Company interprets “documented cleaning methods” to allow generic cleaning procedures to be written which are implemented, as necessary, by trained personnel. Each particular cleaning operation shall have an individual cleaning procedure or reference a generic procedure. The generic procedures will specify methods of cleaning or which type(s) of solvent may be used in a particular application.</p>	<p>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.</p>	<p>Similar Alternative not required under the new program.</p>
A3.3 Cleaning		
Specific cleaning procedures are considered to be part of the	The following general criteria shall apply as part of the	Similar

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manufacturing specifications. The following general criteria shall apply:	manufacturing specifications specific cleaning procedures	
(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.	Similar
(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 process 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.	Similar
(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.	Similar
(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.	Similar
3.4 Methods of Preservation	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 Subsection 3.6 of this Standard for vapor-proof barriers and desiccants.) Clarification from the current VA QATR: (7) With regard to Section 3.4 of ANSI N45.2.2-1972, titled Methods of Preservation: (First sentence) the Company will comply with these requirements subject to the clarifications of Section 3.2.1, (4) and (5) above, and the definition of the phrase “deleterious corrosion” to mean that corrosion which cannot be subsequently removed and which adversely affects form, fit or function.	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.)	Similar To clarify, definition of “deleterious corrosion” is included in Appendix D of the new QA program.
3.4.1 Contact Preservatives.	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	Contact preservatives are compounds applied to bare metal surfaces to prevent surface corrosion during shipping and storage and generally require removal prior to installation.	Similar

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Appendix Section A3.4.1 for additional requirements.)		
A3.4.1 Contact Preservatives.		
The following criteria shall be used when considering the type of contact preservative to be used.	The following criteria shall be used when considering the type of contact preservative to be used.	Similar
(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.	Similar
(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,	Similar
(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 time 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.	Similar
(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 the water flushable type.	(d) 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 piping for systems containing reactor coolant water shall be the water flushable type.	Similar
(5) The name of the preservative used shall be indicated to facilitate touchup.	(e) The name of the preservative used shall be provided to facilitate touch-up..	Similar
(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.	Similar
(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.	Similar
3.4.2 Inert Gas Blankets.	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	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,	Similar

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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.)	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.	
A3.4.2 Inert Gas Blankets.		
When inert gas blankets are used, the following criteria shall apply:	When inert gas blankets are used, the following criteria shall apply.	Similar
(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 leakproof 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,	Similar
(2) Only a commercial grade of dry, oil-free, inert gas shall be used.	(b) Only dry, oil free, inert gas shall be used.	Similar
(3) Provisions shall be made for measuring and maintaining the blanket pressure within the required range within each pressurized purged item or 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.	(c) Provisions shall be made for measuring and maintaining the blanket pressure within the required range and within each pressurized purged item or 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.	Similar
(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.	Similar
3.5 Caps, Plugs, Tapes, and Adhesives	3.5 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.	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.	Similar
3.5.1 Caps and Plugs.	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.)	Caps and plugs shall be used to seal openings in items having sensitive internal surfaces and to protect threads and weld end preparations.	Similar
A3.5.1 Caps and Plugs.		
Caps and plugs shall conform to the following criteria:	Caps and plugs shall conform to the following criteria.	Similar

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(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.	Similar
(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.	Similar
(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.	Similar
(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.	Similar
(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.	Similar
(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.	Similar
(7) Plugs and caps used in contact with austenitic stainless steel shall be made from non-halogenated materials or stainless steel.	(g) Plugs and caps used in contact with austenitic stainless steel shall be made from non-halogenated materials or stainless steel	Similar
3.5.2 Tapes and Adhesives.	3.5.2 Tapes and Adhesives.	
Pressure sensitive, removable, tape should be used in lieu of adhesives in contact with bare metal surfaces. 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 used for identification rather than sealing which are not near a welding operation may remain until system testing. (See Appendix section A3.5.2 for additional requirements.)	Pressure-sensitive, removable tape shall be used in lieu of adhesives in contact with bare metal surfaces. 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. Tapes used for identification rather than sealing that are not near a welding operation may remain until system testing is complete, but shall be removed before plant operations unless qualified for operating conditions.	Similar, use changed from should to shall in NQA-1.
A3.5.2 Tapes and Adhesives.		
Tapes and adhesives shall conform to the following criteria:	Tapes and adhesives shall conform to the following criteria.	Similar
(1) When contacting austenitic stainless steel and nickel alloy	(a) When contacting austenitic stainless steel and nickel alloy	Similar

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surfaces:	surfaces:	
(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. NRC Regulatory Guide 1.38 , Regulatory Position C.2.c: Subdivision A.3.5.2(1)(a)-This guideline states that the halogen and sulfur content of tapes should not be in excess of 0.10% by weight when used in contact with austenitic stainless steel and nickel alloy surfaces. In lieu of this guidelines, tapes, when used with austenitic stainless steel or nickel alloy materials, should not be compounded from or treated with chemical compounds containing elements in such quantities that harmful concentrations could be leached or be released by breakdown of the compound under expected environmental conditions (e.g., by radiation). Examples of such compounds are those containing fluorides, chlorides, sulfur, lead, zinc, copper, and mercury.	(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 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];	Additional detail regarding tape in NQA-1-1994. Addresses Regulatory Position from RG 1.38.
(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 non-halogenated solvent (acetone, alcohol, or equal);	Similar
(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.	Similar
(2) When contacting other surfaces and containers:	(b) When contacting other surfaces and containers:	Similar
(a) Tapes and adhesives used to seal non-austenitic materials or containers are not subject to the above restrictions.	(1) tapes and adhesives used to seal non-austenitic materials or containers are not subject to the above restrictions;	Similar
(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.	Similar
(3) Tapes should be brightly colored to preclude their loss into a system. NRC Regulatory Guide 1.38 , Regulatory Position C.2.d: Subdivision A.3.5.2(3)-This guideline states that tapes should be brightly colored to preclude their loss into a system. In lieu of this guidelines, tapes should be colored to contrast with the materials on which they are used.	(c) When used on surfaces of items, tapes shall be visibly distinguishable from the materials on which they are used.	Similar NQA-1 addresses NRC position in RG 1.38.

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3.6 Barrier and Wrap Materials and Desiccants	3.6 Barrier and Wrap Materials and Desiccants	
<p>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. 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.</p>	<p>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.</p>	<p>Similar</p>
<p>Barrier and wrap materials shall be non-halogenated when used in direct contact with austenitic stainless steel, shall be noncorrosive, shall not readily support combustion and shall not be otherwise harmful to the item packaged. Vapor-proof barrier material, used with desiccants constitutes another preservation system (See Subsection 3.4 of this Standard); it protects against potential damage by water vapor condensate.</p> <p>Clarification from the current VA QATR: (8) With regard to Section 3.6 of ANSI N45.2.2-1972, titled Barrier and Wrap Material and Desiccants: This section requires the use of non-halogenated materials in contact with austenitic stainless steel. Refer to Regulatory Guide 1.37 above for the Company position. (Company position from RG 1.37, (3) With regard to Paragraph C.4 of Regulatory Guide 1.37: Expendable materials such as inks and related products, temperature indicating stick, tapes, gummed labels, wrapping materials (other than polyethylene), water soluble dam materials, lubricants, NDE penetrant materials, and couplants, desiccants, and like materials which contact stainless steel or nickel alloy surfaces; shall not contain lead, zinc, copper, mercury, cadmium and other low melting point metals, their alloys or compounds as basic and essential chemical constituents. No more than 0.1 percent (1000 ppm) halogens will be allowed where such elements are leachable or where they could be released by breakdown of the compounds under</p>	<p>Barrier and wrap materials shall be non-corrosive 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. Vapor-proof barrier materials used with desiccants constitute another preservation system that protects against potential damage by water vapor condensate.</p>	<p>Similar requirement. Alternative not needed under the new QA program.</p>

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expected environmental conditions.		
3.6.1 Water-proof Barrier Material.	3.6.1 Waterproof Barrier Material.	
Water-proof barrier material shall be resistant to grease and water; it shall protect items from airborne and windblown soils.	Waterproof barrier material shall be resistant to grease and water; it shall protect items from airborne and windblown soils.	Similar
3.6.2 Vapor Barrier Material.	3.6.2 Vapor-proof Barrier Material.	
Vapor-proof 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).	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.	Similar
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. The barrier material should be brightly colored to preclude loss within a system. NRC Regulatory Guide 1.38 , Regulatory Position C.2.e: e. Section A.3.6.2-This guidelines states that the vapor barrier material should be brightly colored to preclude loss within a system. In lieu of this guidelines, vapor barrier material should be colored to contrast with the materials on which they are used.	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. Vapor-proof barrier material should be colored to contrast with the material on which it is used.	Similar NQA-1 addresses the NRC position from RG 1.38.
3.6.3 Desiccants.	3.6.3 Desiccants.	
Desiccants may be used within a vapor-proof barrier when condensation or high humidity could damage an item by corrosion, mold, or mildew. (See Appendix A3.6.3 for additional requirements).	Desiccants shall be used within a vapor-proof barrier when condensation or high humidity could damage an item by corrosion, mold, or mildew.	Change from may to shall in NQA-1.
A3.6.3 Desiccants.		
Desiccants shall consist of nondeliquescent, nondusting, chemically inert, dehydrating agents. The following criteria apply when they are used.	Desiccants shall consist of nondeliquescent, non-dusting, chemically inert, dehydrating agents. The following criteria shall apply.	Similar

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<p>(1) When used with austenitic stainless steel, the desiccant and the bag material shall not have a halogen content over 0.25%. The desiccant bag shall be made of puncture, tear and burst resistant material.</p> <p>NRC Regulatory Guide 1.38, Regulatory Position C.1.c: Subdivision A.3.6.3(1) of ANSI N45.2.2-1972 permits desiccants and desiccant bag materials containing not more than 0.25% halogens to be used with austenitic stainless steels. In lieu of this requirement, desiccants and the materials for the desiccant bags, when used with austenitic stainless steel or nickel alloy materials, should not be compounded from or treated with chemical compounds containing elements in such quantities that harmful concentrations could be leached or be released by breakdown of the compounds under expected environmental conditions (e.g., by radiation). Examples of such compounds are those containing fluorides, chlorides, sulfur, lead, zinc, copper, and mercury.</p>	<p>(a) The desiccant bag shall be made of puncture-, tear-, and burst-resistant material</p> <p>(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.</p>	<p>NQA-1 splits the statements from A3.6.3.(1) into two parts. It also addresses the NRC position from RG 1.38.</p>
<p>(2) The reactivation temperature and time shall be marked on the desiccant container.</p>	<p>(c) The reactivation temperature and time shall be marked on the desiccant container..</p>	<p>Similar</p>
<p>(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.</p>	<p>(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.</p>	<p>Similar</p>
<p>(4) Desiccant bags and canisters, when used, shall be secured to prevent movement, rupture of the bags, or damage to the item being protected.</p>	<p>(e) Desiccant bags and canisters, when used, shall be secured to prevent movement, rupture of the bags, or damage to the item being protected.</p>	<p>Similar</p>
<p>(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.</p>	<p>(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.</p>	<p>Similar</p>
<p>(6) Items which contain desiccants shall have all openings securely sealed. When flange connections are a part of the barriers, O-rings or gaskets shall be used with all bolts in place and tightened sufficiently to insure a water-vapor-proof seal. Weld end preparations, after capping, shall be covered with a water-vapor proof seal.</p>	<p>(g) Items that contain desiccants shall have all openings securely sealed. When flange connections are a part of the barriers, O-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</p>	<p>Similar</p>

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(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.	Similar
(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.	Similar
Formula I: To determine minimum of desiccant for use with other than sealed rigid metal barrier: $U = 1.6A \text{ plus } XD.$	Formula I To determine minimum units of desiccant for use with other than sealed rigid metal barrier: $U = 1.6A + XD$	Similar
Formula II: To determine minimum units of desiccant for use within sealed rigid metal barrier: $U = KV \text{ plus } XD.$	Formula II To determine minimum units of desiccant for use with sealed rigid metal barrier: $U = KV + XD$	Similar
<p>In the above formulas:</p> <p>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 *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.</p>	<p>Where</p> <p>A = area of barrier, sq ft ($m^2 \times 0.0929$) U = number of units of desiccant to be used (see Note) D = dunnage (other than metal) within barrier, lb. ($kg \times 2.2$) K = 0.0007 when volume is given in cu in. K = 1.2 when volume is given in cu ft K = 0.000425 when volume is given in cm^3 ($42.5 \text{ in } m^3$) 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 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 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.</p>	Similar, NQA-1 adds K factors for volumes in cubic centimeters and cubic meters.
(9) A humidity indicator shall be included in every water-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.	(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	Similar

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	desiccant.	
3.7 Container, Crating and Skids	3.7 Containers, Crating, and Skids	
3.7.1 Containers.	3.7.1 Containers.	
Containers are used when maximum protection for the item or its barrier is required. Domestic types used shall be limited to:	Containers shall be used when maximum protection for the item or its barrier is required. Domestic types used shall be limited to the following:	Similar
(1) Cleated, sheathed boxes (500 lb. maximum net weight). Clarification from the current VA QATR: (9) With regard to Section 3.7.1 of ANSI N45.2.2-1972, titled Containers : Cleated, sheathed boxes may be used up to 1000 lb rather than 500 lb as specified in 3.7.1(1). This type of box is safe for, and has been tested for, loads up to 1000 lb. Other national standards allow this (see Federal Specification PPP-B-601). Special qualifications testing shall be required for loads above 1000 lb.	(a) cleated, sheathed boxes [500 lb. (227 kg) maximum net weight]	Similar Alternative not required under new QA program.
(2) Nailed wood boxes.	(b) nailed wood boxes	Similar
(3) Wood-cleated solid fiberboard boxes.	(c) wood-cleated solid fiberboard boxes	Similar
(5) Metal or fiber drums.	(d) metal or fiber drums	Similar
(6) Crates (See Paragraph 3.7.2).	(e) crates (see para. 3.7.2)	Similar
(7) Wire bound boxes (200 lb. maximum net weight).	(f) wire bound boxes [200 Lb. (91 kg) maximum net weight]	Similar
(8) Other specially designed containers for special equipment.	(g) other specially designed containers for special equipment	Similar
(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 changed the order of the list to coincide with the additional information below for fiberboard boxes.
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.)		Addressed in item 5 below for NQA-1.
A3.7.1 Fiberboard Boxes.		
The following criteria apply for fiberboard boxes used as exterior containers:	The following criteria shall apply for fiberboard boxes used as exterior containers.	Similar
(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).	Similar

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(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).	Similar
(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.	Similar
(4) Boxes shall be strapped with pressure-sensitive reinforced tape, length-wise (top, bottom and ends), girthwise (top, bottom and sides) and horizontal sides and ends.	(4) Boxes shall be strapped with pressure-sensitive reinforced tape, lengthwise (top, bottom, and ends), girthwise (top, bottom, and sides), and horizontal sides and ends.	Similar
(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. 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.	Similar, 2 nd sentence also compares to N45.2.2 (See section 3.7.1)
3.7.2 Crates and Skids.	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. Clarification from the current VA QATR: (10) With regard to Section 3.7.2 of ANSI N45.2.2-1972, titled Crates and Skids : Skids or runners will normally be used on containers with a gross weight of 100 lb or more. Skids or runner will normally be fabricated from 4 x 4 inch nominal lumber size, minimum, and laid flat except where this is impractical because of the small dimensions of the container. If forklift handling is required, minimum floor clearance for forklift tines will be provided.	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.	Similar Clarification not required under the new QAPD.
3.8 Cushioning, Blocking, Bracing and Anchoring	3.8 Cushioning, Blocking, Bracing, and Anchoring	
3.8.1 Cushioning	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 A3.8.1 for additional requirements.)	Cushioning shall be used where protection from shock and vibration is required. The cushioning materials shall have sufficient strength to perform this function.	Similar
A3.8.1 Cushioning.		
Selection of cushioning materials shall be based on the	Selection of cushioning material shall be based on the following.	Similar

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following:		
(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.	Similar
(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-vapor-proof barrier.	Similar
(3) It shall have negligible dusting characteristics.	(c) It shall have negligible dusting characteristics.	Similar
(4) It shall not readily support combustion.	(d) It shall not readily support combustion.	Similar
3.8.2 Blocking and Bracing.	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. The blocking and bracing used to prevent item movement shall withstand thrust and impact applied in any direction. 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 for protection of the load to be supported shall be compatible with the size, shape, and strength of bearing areas of the shipment. The blocking and bracing used to prevent item movement shall withstand thrust and impact applied in any direction. Blocking and bracing used in direct contact with the item being blocked shall not have a corrosive effect on the item.	Similar
3.8.3 Anchoring.	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. To facilitate disassembly and minimize damage when removing container contents, bolting is preferred. (See Appendix A3.8.3 for additional requirements).	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.	Similar
A3.8.3 Anchoring.		
When bolts are used for anchoring the following criteria shall apply	When bolts are used for anchoring, the following criteria shall apply.	Similar
(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.	Similar
(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.	Similar
(3) When mounting items to container bases equipped with	(c) When mounting items to container bases equipped with	Similar

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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.	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.	
(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.	Similar
(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.	Similar
(From 3.8.3, not the appendix.) 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.	Similar
3.9 Marking	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.)	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. If equipment does not lend itself to marking, records shall be maintained that are uniquely identifiable to the item.	Similar
A3.9 Marking		
Items shall be marked to preserve identity in accordance with the following criteria	Items shall be marked to preserve identity in accordance with the following criteria.	Similar
(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 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 0.010 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.	(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 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.	Similar
(2) The marking shall not be deleterious to the material nor	(b) The marking shall not be deleterious to the material nor	Similar

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violate any other section of this standard.	violate any other Section of Subpart 2.2.	
(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.	Similar
(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.	Similar
(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	Similar
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.	Similar
(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.	Similar
(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.	Similar
(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.	Similar
(4) Container markings shall be applied with waterproof ink or paint in characters no less than 3/4 inch high, container size permitting. Clarification from the current VA QATR: (24) With regard to Section A3.9 of ANSI N45.2.2-1972, titled Marking: As an alternative to the requirements in Subpart 4, the Company may choose to mark containers with waterproof ink or paint with legible characters. (See 6 below for continuation.)	(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. (1 2.7 mm), as permitted by container size.	Modified requirement in NQA-1. Alternative has been addressed in NQA-1-1994.
(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.	Similar
(6) Container marking shall include the following information: (a) Destination (b) Return address (c) Package numbers showing the purchase order number,	(f) Container markings shall include the following information (1) destination (2) return address (3) package numbers showing the purchase order number,	Similar A similar alternative proposed in the new QAPD.

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<p>followed by the package number and the total number of packages.</p> <p>(d) Material identification number</p> <p>(e) Handling instructions - Fragile, Center of Gravity, Keep Dry, This Side Up, Sling Here, Do Not Freeze, stacking limitations as appropriate.</p> <p>(f) Weight of package (in excess of 100 pounds).</p> <p>(g) Special Instructions. Desiccant Inside, Special Inspection, Storage, Unpacking Restrictions, etc. as appropriate.</p> <p>Clarification from the current VA QATR: (24) With regard to Section A3.9 of ANSI N45.2.2-1972, titled Marking: ... Additionally, the requirements of Subpart 6 shall only apply to shipment of items. Items in storage shall be affixed with labels or tags with sufficient information to preserve the item's identity.</p>	<p>followed by the package number and the total number of packages</p> <p>(4) material identification number</p> <p>(5) handling instructions (e.g., Fragile, Center of Gravity, Keep Dry, This Side Up, Sling Here, Do Not Freeze) and stacking limitations, as appropriate</p> <p>(6) weight of package [in excess of 100 Lb. (45.5 kg)</p> <p>(7) special instructions (Desiccant Inside, Special Inspection, Storage, Unpacking Restrictions, etc.) as appropriate</p>	
<p>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.</p>	<p>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.</p>	Similar
<p>4.0 SHIPPING</p>	<p>4 SHIPPING</p>	
<p>4.1 General</p> <p>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.</p> <p>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).</p> <p>NRC Regulatory Guide 1.38, Regulatory Position C.1.e: Notwithstanding the provisions of subdivision 1.2 of ANSI N45.2.2-1972 with respect to the applicability of this standard</p>	<p>4.1 General</p> <p>This Section covers the requirements for loading and shipment of items as defined in para. 2.2. 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).</p>	Similar

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and the definition of carrier contained in subdivision 1.4 of ANSI N45.2.2-1972, nothing contained in Section 4, "Shipping," of ANSI N45.2.2-1972 should be deemed to require a common or contract carrier transporting or shipping byproduct, source, or special nuclear material in the ordinary course of its business to comply with the provisions set forth in this section of the standard. In this situation these carriers are exempt from NRC regulation under the provisions of 10 CFR [SECTIONS] 30.13, 40.12, and 70.12. Therefore, the provisions of Section 4 of ANSI N45.2.2-1972 apply only to the extent that they affect the activities of an NRC licensee (e.g., requirements related to shipping contained in 10 CFR Part 71) or a private carrier subject to NRC regulations.		
4.2 Transportation Requirements	4.2 Transportation Requirements	
4.2.1 Open Carriers.	4.2.1 Open Carriers.	
For shipment on open carriers where items may be exposed to adverse environmental conditions, the following shall apply:	For shipment on open carriers where items may be exposed to adverse environmental conditions, the following shall apply.	Similar
(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.	Similar
(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.	Similar
4.2.2 Closed Carriers.	4.2.2 Closed Carriers.	
For shipment on closed carriers the following shall apply:	For shipment on closed carriers the following shall apply.	Similar
(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.	Similar
(2) Use of fully enclosed furniture vans is recommended when shipping large delicate items such as control panels.		Not a requirement.
4.2.3 Special Shipments. NRC Regulatory Guide 1.38 , Regulatory Position C.2.a	4.2.3 Special Shipments.	NRC position is that the term should be treated as shall. Position is incorporated into

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2. The guidelines (indicated by the verb "should") of ANSI N45.2.2-1972 contained in the following section are considered to have sufficient safety importance to be treated the same as the requirements of the standard, subject to any exceptions noted: a. Section 4.2.3-The guidelines concerning special shipments.		NQA-1.
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:	Items that exceed established weight or size limitations for railroads or highways or require special handling shall be given additional consideration in the following areas.	Similar
(1) The type of bracing and tie down methods to be used with the mode of transportation selected for special shipment shall be specified.	(a) The type of bracing and tie down methods to tie used with the mode of transportation selected for special shipments shall be specified.	Similar
(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.	Similar
(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.	Similar
(4) The use of "Escorts" may be specified to accompany shipments, when additional surveillance is required during transit of certain items.		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 enroute, and during unloading. Prior to shipment the route shall have been investigated to	(d) For special shipments, the conveyance used for transport shall be certified to be structurally adequate to take the loads imposed during loading, while enroute, and during unloading. Prior to shipment the route shall have been investigated to	Similar

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assure safe transit.	assure safe transit.	
4.3 Precautions During Loading and Transit	4.3 Precautions During loading and Transit	
Clarification from the current VA QATR: (11) With regard to Sections 4.3, 4.4 and 4.5 of ANSI N45.2.2-1972, titled, respectively, Precautions During Loading and Transit, Identification and Marking, and Shipment from Countries Outside the United States: The Company will comply with the requirements of these Sections subject to the clarifications taken to other Sections which are referenced herein.		Similar Clarification not needed for the new QA program.
4.3.1 Loading.	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 proper handling during loading, transfer between carriers, and unloading (See Section 7 of this Standard).	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 handling during loading, transfer between carriers, and unloading (see Section 7).	Similar
4.3.2 Rigging.	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.	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.	Similar
4.3.3 Handling Precautions.	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.	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.	Similar
4.3.4 Package/Preservative Coatings.	4.3.4 Package and Preservative Coatings.	
Packages and/or preservative coatings shall be visually inspected after loading, and damaged areas repaired prior to shipment. Items shipped with desiccants shall be inspected after loading to assure that sealed areas are intact.	Package or preservative coatings shall be visually inspected after loading and damaged areas repaired prior to shipment. Items shipped with desiccants shall be inspected after loading to assure that sealed areas are intact.	Similar
4.3.5 Sealed Openings.	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.	Sealed openings shall be visually inspected after loading to assure closures are intact. Materials used for resealing shall be in accordance with Section 3.	Similar

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<p>4.3.6 Stacking.</p> <p>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.</p> <p>NRC Regulatory Guide 1.38, Regulatory Position C.2.b: 2. The guidelines (indicated by the verb "should") of ANSI N45.2.2-1972 contained in the following section are considered to have sufficient safety importance to be treated the same as the requirements of the standard, subject to any exceptions noted: b. Section 4.3.6-The guideline that addresses written instruction on stacking.</p>	<p>4.3.6 Stacking.</p> <p>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.</p>	<p>NRC position is that the term should be treated as shall. Position is incorporated into NQA-1.</p>
<p>4.3.7 Theft and Vandalism.</p>	<p>4.3.7 Theft and Vandalism.</p>	
<p>Precautions shall be taken to minimize the possibility of theft and vandalism during shipment of items.</p>	<p>Precautions shall be taken to minimize the possibility of theft and vandalism during shipment of items.</p>	<p>Similar</p>
<p>4.4 Identification and Marking</p>	<p>4.4 Identification and Markings</p>	
<p>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.</p>	<p>Identification and markings on the outside of all packages, skids, or protective covering shall be maintained.</p>	<p>Similar</p>
<p>4.5 Shipments From Countries Outside United States</p>	<p>4.5 Shipments From Countries Outside the United States</p>	
<p>4.5.1 Overseas Shipment.</p>	<p>4.5.1 Overseas Shipment.</p>	
<p>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.</p>	<p>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.</p>	<p>Similar</p>
<p>4.5.2 Inspection at Point of Shipment.</p>	<p>4.5.2 Inspections at Point of Shipment.</p>	
<p>For Special shipments, items shall be inspected to insure integrity of packaging or protective enclosures after being loaded aboard ship.</p>	<p>Items shall be inspected to ensure integrity of packaging or protective enclosures after being loaded aboard ship.</p>	<p>Similar</p>
<p>4.5.3 Inspection at Port of Entry.</p>	<p>4.5.3 Inspection at Port of Entry.</p>	
<p>For special shipments, items shall be inspected to insure integrity of packaging or protective enclosures when items are off loaded at the port of entry.</p>	<p>Items shall be inspected to ensure integrity of packaging or protective enclosures when items are off-loaded at the port of entry.</p>	<p>Similar</p>

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4.5.4 Identification and Markings.	4.5.4 Identification and Markings.	
Identification and markings shall follow the procedure outlined in Subsection 3.9 of this standard. 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.	Identification and markings shall follow the procedure outlined in para. 3.9.	Similar
4.5.5 Transportation Requirements.	4.5.5 Transportation Requirements.	
Requirements outlined in Subsection 4.2 (Transportation) and in Section 7 of this standard shall be followed where applicable.	Requirements outlined in para. 4.2 and Section 7 shall be followed where applicable.	Similar
4.6 Nuclear Material Shipment	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.	Special nuclear material and sources shall be shipped as specified in the NRC fuel license and by other regulatory agencies.	Similar
5. RECEIVING	5 RECEIVING	
5.1 General	5.1 General	
This section contains requirements that are to be fulfilled by the organization or organizations responsible for the receiving of items. Receiving starts when the items arrive at a storage facility or construction site before unloading or unpacking. 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.	The requirements that shall be fulfilled by the organization(s) responsible for the receiving of items. Receiving starts when the items arrive at a storage facility or construction site before unloading or unpacking.	Similar, but examples of items included in receiving have not been included in this paragraph of NQA-1
5.2 Receiving Inspection Requirements	5.2 Receiving Inspection Requirements	
5.2.1 Shipping Damage Inspection.	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. Clarification from the current VA QATR: (12) With regard to Section 5.2.1 of ANSI N45.2.2-1972, titled Shipping Damage Inspection: Warehouse personnel will normally visually scrutinize incoming shipments for damage of	Preliminary visual inspection shall be performed prior to or immediately after unloading to determine if any damage occurred during shipping.	Similar Clarification no longer needed with the new QA program.

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the types listed in this Section; this activity is not necessarily performed prior to unloading. Since all required items receive the Item Inspection of Section 5.2.2, separate documentation of the Shipping Damage Inspection is not necessary. Release of the transport agent after unloading and signing for receipt of the shipment may be all of the action taken to document completion of the Shipping Damage Inspection. Any non-conformance noted will be documented and dispositioned as required by Section 17.2.15 of the Operational QA Program. The person performing the visual scrutiny during unloading is not considered to be performing an inspection function as defined under Regulatory Guide 1.74; therefore, while he will be trained to perform this function he may not necessarily be certified (N45.2.6) as an Inspector.		
Observations for unusual conditions shall include:	Observations for unusual conditions shall include:	Similar
(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;	Similar
(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;	Similar
(3) Environmental Damage - Water or oil marks, damp conditions, dirty areas, or salt film (indicating exposure to sea water or winter road salt chemicals).	(c) environmental damage - water or oil marks, damp conditions, dirty areas, or salt film, indicating exposure to seawater or winter road salt chemicals;	Similar
(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;	Similar
(5) Rough Handling - Splintered, torn, or crushed containers indicating improper handling. Review of impact recording instrument readings.	(e) rough handling - splintered, torn, or crushed containers, indicating improper handling; (f) review of impact recording instrument readings against established criteria. See para. 4.2.3(c).	Clarified by separating into two separate checks in NQA-1.
5.2.2 Item Inspection.	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. When items are contained in transparent separate	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. When items are contained in transparent, separate	Similar

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moisture-proof bags or envelopes, visual inspection without unpacking the contents is acceptable.	moisture-proof bags or envelopes, visual inspection without unpacking the contents shall be acceptable.	
Statistical sampling methods may be used for groups of similar items. 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).	Where specific inspection requirements can be achieved, statistical sampling methods may be used for groups of similar items. 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).	Similar
These inspections and examinations shall include the following as appropriate:	These inspections and examinations shall include the following, as appropriate:	Similar
(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);	Similar
(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;	Similar
(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;	Similar
(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;	Similar
(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;	Similar
(6) Desiccant - Verification that the desiccant is not saturated, as indicated through the use of humidity indicators. Desiccants shall be regenerated or replaced as necessary in accordance with special instructions.	(f) desiccant - verification that the desiccant is not saturated, as indicated, through the use of humidity indicators. Desiccants shall be regenerated or replaced as necessary in accordance with special instructions.	Similar
(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 burns.	Similar

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(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.	Similar
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. These inspections or examinations shall include such items as: Clarification from the current VA QATR: (13) With regard to Section 5.2.2 of ANSI N45.2.2-1972, titled Item Inspection: The second division of this subsection requires six additional inspection activities if an item was not inspected or examined at the source. Procurement Engineering shall determine and document the extent of receipt inspection based on consideration of Paragraph 5.2.2	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. These inspections shall include such items as:	Similar Clarification not needed in the new QA program, this is a level of detail to be addressed by the administrative controls for the inspection program.
(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;	Similar
(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 assure that important dimensions conform with drawings and specifications, i.e., baseplate mounting holes, overall external size, and configuration and orientation of parts;	Similar
(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;	Similar
(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;	Similar
(5) Lubricants and Oils - Verification of presence of proper lubricants and oils, if required, by either specification, purchase	(e) lubricants and oils - verification of presence of proper lubricants and oils, if required, by either specification, purchase	Similar

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order, or manufacturers' instructions.	order, or manufacturer's instructions;	
(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.	Similar
5.2.3 Special Inspection -	5.2.3 Special Inspection.	
Where receiving inspection in addition 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.	Where receiving inspection in addition to that 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.	Similar
5.3 Disposition of Received Items	5.3 Disposition of Received Items	
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.	Similar
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.	Similar when taking into consideration the information addressed in NQA-1, Part 1.
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.	Similar
5.4 Status Indicating System	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	A status indicating system is a system or method for identifying the status of items (e.g., an inventory system, tagging, labeling,	Similar Clarification not needed under

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<p>employed that clearly indicates whether items are acceptable or unacceptable for installation. A controlled physical separation is an acceptable equivalent method. The system shall indicate the date the item was placed in the acceptable or unacceptable installation status. The 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. When tags are used the stock shall be made from material which will not deteriorate during storage; tags shall be securely affixed to the items and displayed in an area that is readily accessible. The stock used shall not be deleterious to the item.</p> <p>Clarification from the current VA QATR: (14) With regard to Section 5.4 of ANSI N45.2.2-1972, titled Status Indicating System The Section states in part “Tags shall be securely affixed to the items and displayed in an area that is readily accessible.” As an alternative, the company may choose to use Labels or Tags to identify items.</p>	<p>color code) that clearly indicates whether items are acceptable or unacceptable for installation. A controlled physical separation is an acceptable equivalent method. The system shall provide for indication of the date the item was placed in the acceptable or unacceptable installation status and the conditional release of the items for installation pending the subsequent correction of the nonconformance. When tags are used, the stock shall be made from material that will not deteriorate during storage. The stock used shall not be deleterious to the item. Tags shall be securely affixed to the items and displayed in an area that is readily accessible.</p>	<p>the new QA program.</p>
<p>5.5 Correction of Nonconformances</p>		
<p>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</p>		<p>See NQA-1, Part I, Basic Requirement 15 and Supplement 15S-1. Wording is similar.</p>
<p>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.</p>		<p>See NQA-1, Part I, Basic Requirement 15 and Supplement 15S-1. Wording is similar.</p>
<p>5.6 Marking</p>	<p>5.5 Marking</p>	
<p>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).</p>		<p>Not a requirement.</p>

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Changing, correcting or any other marking on Code Stamp name plate is prohibited, unless authorized by the manufacturer whose serial number is applied.	Changing, correcting, or any other marking on Code stamp nameplate shall be prohibited, unless authorized by the manufacturer of the item.	Similar
5.7 Documentation	5.6 Documentation	
A written record of the receiving inspection, package identification, tagging, corrective actions, and justification for conditional acceptance shall be prepared. These records shall be made a part of the permanent records provided for in Section 8 of this standard.	A written record of the receiving inspection, package identification, tagging, corrective actions, and justification for conditional acceptance shall be prepared	Similar
6. STORAGE	6 STORAGE	
6.1 General	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. 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.	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 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.	Similar
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.	Similar
(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.	Similar
(2) 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. 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	(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. 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	Similar Clarification not needed for the new QA program.

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<p>permit air circulation. The area shall be provided with uniform heating and temperature control or its equivalent to prevent condensation and corrosion. Minimum temperature shall be 40 F and maximum temperature shall be 140 F or less if so stipulated by a manufacturer.</p> <p>Clarification from the current VA QATR: (15) With regard to Section 6.1.2 of ANSI N45.2.2-1972, titled Levels of Storage: Subpart (2) is replaced with the following: (2) Level B items shall be stored within a fire resistant, weather-tight, and well ventilated building or equivalent enclosure in which measures have been taken against vandalism. This building shall be situated and constructed so that it will not normally be subject to flooding; the floor shall be paved or equal, and well drained. If any outside waters should come in contact with stored equipment, such equipment will be labeled or tagged non-conforming, and then the non-conformance document will be processed and evaluated in accordance with Section 17.2.15. Items shall be placed on pallets, shoring or shelves to permit air circulation. The building shall be provided with uniform heating and temperature control or its equivalent to prevent condensation and corrosion. Minimum temperature shall be 40°F and maximum temperature shall be 140°F or less if so stipulated by a manufacturer.</p>	<p>permit air circulation. The area shall be provided with uniform heating and temperature control or its equivalent to prevent condensation and corrosion. The minimum temperature shall be 40°F (5°C), and the maximum temperature shall be 140°F (60°C) or less if so stipulated by the manufacturer.</p>	
<p>(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.</p>	<p>(c) Level C items shall be stored indoors or in an equivalent environment with all provisions and requirements as set forth for Level B items, except that heat and temperature control is not required.</p>	<p>Similar</p>
<p>(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 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.</p>	<p>(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 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.</p>	<p>Similar</p>

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6.2 Storage Areas	6.2 Storage Areas	
Periodic inspections shall be performed to assure that storage areas are being maintained in accordance with these requirements. The housekeeping requirements shall be in accordance with N45.2.3.	Periodic inspections shall be performed to assure that storage areas are being maintained in accordance with applicable requirements.	Similar
6.2.1 Access to Storage Areas.	6.2.1 Access to Storage Areas.	
Access to storage areas shall be controlled and limited only to personnel designated by the responsible organization. Clarification from the current VA QATR: (16) With regard to Section 6.2.1 of ANSI N45.2.2-1972, titled Access to Storage Areas : Items which fall within the Level D classification of the standard will be stored in an area which may be posted to limit access, but other positive controls such as fencing or guards will not normally be provided.	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.	Similar Clarification not needed for the new QA program.
6.2.2 Cleanliness and Housekeeping practices.	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 material and other detrimental soil.	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.	Similar
6.2.3 Fire Protection.	6.2.3 Fire Protection	
Fire protection commensurate with the type of storage area and the material involved shall be provided and maintained.	Fire protection commensurate with the type of storage area and the material involved shall be provided and maintained.	Similar
6.2.4 Storage of Food and Associated Items.	6.2.4 Storage of Food and Associated Items.	
The use or storage of food, drinks, and salt tablets dispensers in any storage area shall not be permitted. Clarification from the current VA QATR: (17) With regard to Section 6.2.4 of ANSI N45.2.2-1972, titled Storage of Food and Associated Items : The sentence is replaced with the following: "The use or storage of food, and drinks in any storage area shall be controlled and shall be limited to designated areas where such use or storage is not deleterious to stored items where station management deems appropriate.	The use or storage of food, drinks, and salt tablet dispensers in controlled storage areas shall not be permitted.	Similar Clarification not needed for the new QA program.
6.2.5 Measures to Prevent Entrance of Animals.	6.2.5 Measures to Prevent Entrance of Animals.	
Measures shall be taken to prevent the entrance of rodents and	Measures shall be taken to prevent the entrance of rodents and	Similar

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<p>other animals into indoor storage areas or equipment to minimize possible contamination and mechanical damage to stored material.</p> <p>Clarification from the current VA QATR: (18) With regard to Section 6.2.5 of ANSI N45.2.2-1972, titled Measures to Prevent Entrance of Animals: The sentence is replaced with the following: “Exterminators or other appropriate measures shall be used to control animals to minimize possible contamination and mechanical damage to stored material.”</p>	<p>other animals into indoor storage areas or equipment to minimize possible contamination and mechanical damage to stored material.</p>	<p>Clarification not needed for the new QA program.</p>
6.3 Storage Methods	6.3 Storage Methods	
Storage methods and procedures shall comply with the requirements described in the following paragraphs.	Storage methods and procedures shall comply with the requirements described in the following paragraphs.	Similar
6.3.1 Ready Access to Stored Items.	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.	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.	Similar
6.3.2 Arrangement of Items.	6.3.2 Arrangement of Items.	
Items stacked for storage shall be arranged so that racks, cribbing or crates are bearing the full weight without distortion of the item.	Items stacked for storage shall be arranged so that racks, cribbing, or crates are bearing the full weight without distortion of the item.	Similar
6.3.3 Storage of Hazardous Material.	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 which are not in close proximity to important nuclear plant items.	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.	Similar
6.3.4 Identification	6.3.4 Identification.	
<p>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.</p> <p>Clarification from the current VA QATR: (19) With regard to Section 6.3.4 of ANSI N45.2.2-1972 titled Identification: The section states “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.” The company shall substitute “All items (or,</p>	<p>Items and their containers shall be plainly marked so that they are easily identified without excessive handling or unnecessary opening of crates and boxes.</p>	<p>Similar Clarification not needed for the new QA program.</p>

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if in containers, their containers) shall be plainly marked so that they are easily identified without excessive handling or unnecessary opening of crates and boxes.”		
6.3.5 Coverings.	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.	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.	Similar
	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.	Added in NQA-1-1994.
6.4 Control of Items in Storage	6.4 Control of Items in Storage	
Control of items in storage is described in the following paragraphs.	Control of items in storage is described in the following paragraphs.	Not a requirement
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 under Section 3 of this standard is being maintained. Deficiencies noted shall be corrected and documented.	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. Deficiencies noted shall be corrected and documented.	Similar
The characteristics verified during this inspection or examination shall include such items as:	The characteristics verified during this inspection shall include such items as:	Similar
(1) Identification and marking (See Subsection 3.9 of this Standard).	(a) identification and marking (see para. 3.9)	Similar
(2) Protective covers and seals (See Subsection 3.9 of this Standard).	(b) protective covers and seals (see para. 3.6)	Similar
(3) Coatings and preservatives (See Paragraph 3.4.1).	(c) coatings and preservatives (see para. 3.4.1)	Similar
(4) Desiccants and inert gas blankets (See Paragraph 3.6.3 and 3.4.2).	(d) desiccants and inert gas blankets (see paras. 3.6.3 and 3.4.2)	Similar
(5) Physical damage.	(e) physical damage	Similar
(6) Cleanness.	(f) cleanness	Similar

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6.4.2 Care of Items. Care of items in storage shall be exercised in accordance with the following. Requirements for proper maintenance during storage shall be documented and written procedures or instructions shall be established.	6.4.2 Care of Items. Requirements for proper maintenance during storage shall be documented. Care of items in storage (includes storage in place) shall be exercised in accordance with the following.	Similar
(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.	Similar
(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.	Similar
(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 reprocessed 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.	Similar
(4) Instrumentation racks shall be energized as specified by the manufacturer	(d) Instrumentation racks shall be energized as specified by the manufacturer.	Similar
(5) Space heaters enclosed in electrical items shall be energized. Alternative from the current VA QATR: (20) With regard to Section 6.4.2 of ANSI N45.2.2-1972, titled Care of Items : The following alternatives are provided for the indicated subpart: (5)“Space heaters in electrical equipment shall be energized unless a documented engineering evaluation determines that such space heaters are not required.”	(e) Space heaters enclosed in electrical items shall be energized.	Similar A similar alternative proposed for the new QA program.
(6) Rotating electrical equipment shall be given insulation resistance tests on a scheduled basis. Alternative from the current VA QATR: (20) With regard to Section 6.4.2 of ANSI N45.2.2-1972, titled Care of Items : The following alternatives are provided for the indicated subpart:	(f) Rotating electrical equipment shall be given insulation resistance tests on a scheduled basis.	Similar A similar alternative proposed for the new QA program.

Packaging, Shipping, Receiving, Storage And Handling Of Items For Nuclear Power Plants (During The Construction Phase) N45.2.2	Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Nuclear Power Plants NQA-1 1994 Subpart 2.2	Comments
(6) "Large (greater than or equal to 50HP) rotating electrical equipment shall be given insulation resistance tests on a scheduled basis unless a documented engineering evaluation determines that such tests are not required."		
<p>(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 degree and 450 degree rotations are examples.)</p> <p>Alternative from the current VA QATR:</p> <p>(20) With regard to Section 6.4.2 of ANSI N45.2.2-1972, titled Care of Items : The following alternatives are provided for the indicated subpart:</p> <p>(7) "Within thirty days of having been placed in storage, rotating equipment weighing over approximately 50 pounds shall be evaluated by engineering personnel to determine if shaft rotation in storage is required: The results of the evaluation shall be documented. If rotation is required, it shall be performed at specific intervals, be documented, and be conducted so that parts receive a coating of lubrication where applicable and so that the shaft does not come to rest in the same position occupied prior to rotation. For long shafts or heavy equipment subject to undesirable bowing, shaft orientation after rotation shall be specified and obtained."</p>	<p>(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).</p>	<p>Similar A similar alternative proposed for the new QA program.</p>
(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.	Similar
6.4.3 Post Fire Evaluation.	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.	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.	Similar
6.5 Removal of Items from Storage	6.5 Removal of Items From Storage	
Only items which have been inspected and are considered	Only items which have been inspected and are considered	Similar

Packaging, Shipping, Receiving, Storage And Handling Of Items For Nuclear Power Plants (During The Construction Phase) N45.2.2	Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Nuclear Power Plants NQA-1 1994 Subpart 2.2	Comments
<p>acceptable for installation or use in accordance with the receiving inspection procedure shall be removed from storage for installation or use. (See Section 5 of this Standard.) 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.</p> <p>Clarification from the current VA QATR: (21) With regard to Section 6.5 of ANSI N45.2.2-1972, titled Removal of Items from Storage: The Company does not consider the last sentence of this Section to be applicable to the operations phase due to the relatively short period of time between installation and use. The first sentence of the Section is replaced with: “the Company will develop, issue, and implement a procedure(s) which cover(s) the removal of items from storage. The procedure(s) will assure that the inspection status of all material issued is known, controlled and appropriately dispositioned.”</p>	<p>acceptable for installation or use in accordance with the receiving inspection procedure shall be removed from storage for installation or use (see Section 5). 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.</p>	<p>Clarification not required for the new QA program.</p>
<p>6.6 Storage Records</p>	<p>6.6 Storage Records</p>	
<p>Written records shall be prepared that include such pertinent information as storage location, inspection results, protection, and personnel access.</p> <p>Clarification from the current VA QATR: (22) With regard to Section 6.6 of ANSI N45.2.2-1972, titled Storage Records: The Company will comply with the requirements of this Section with the clarification that, for record purposes, only the access of personnel not specifically authorized such by station management into indoor storage areas shall be recorded. Unloading or pick-up of material shall not be considered “access,” nor shall inspection by maintenance and modification inspection personnel or audit by Nuclear Oversight personnel, authorized contractors, NRC or other regulatory agents, nor shall tours by non-employees.</p>	<p>Written records shall be prepared that include such pertinent information as storage location, inspection results, protection, and personnel access.</p>	<p>Similar Alternative proposed in the new QA program to clarify the records requirements for access to storage facilities.</p>

Packaging, Shipping, Receiving, Storage And Handling Of Items For Nuclear Power Plants (During The Construction Phase) N45.2.2	Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Nuclear Power Plants NQA-1 1994 Subpart 2.2	Comments
7. HANDLING	7 HANDLING	
7.1 General	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.	The requirements that shall be fulfilled by the organizations responsible for handling items are contained in subpart 2.15.	Subpart 2.15 requirements are compared to these requirements of N45.2.2 in the table for Subpart 2.15.
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. 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. Items not specifically covered above shall be handled in accordance with sound material handling practices.		
7.3 Hoisting Equipment		
All equipment for handling items shall be used and maintained in accordance with the following:		
7.3.1 Hoisting equipment used for handling shall be certified by the manufacturer. The certification shall indicate the various parameters for the maximum load to be handled.		
7.3.2 Hoisting equipment shall not be loaded beyond its rated load, as certified by the manufacturer, except for test purposes.		
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.		
7.3.4 For special lifts, hoisting equipment may be re-rated, or modified and re-rated, upon approval by the manufacturer or if		

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<p>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.</p> <p>NRC Regulatory Guide 1.38, Regulatory Position C.1.b: b. Subdivision 7.3.4 of ANSI N45.2.2-1972 delineates requirements for re-rating hoisting equipment for special lifts. This subdivision requires that re-rated equipment be given a dynamic load test over the full range of the lift, using a test weight at least equal to the lift weight. In lieu of this requirement, the test weight used in temporarily re-rating hoisting equipment for special lifts in accordance with the provisions of subdivision 7.3.4 should be at least equal to 110% of the lift weight.</p> <p>Clarification from the current VA QATR: (23) With regard to Section 7.3 of ANSI N45.2.2-1972, titled Hoisting Equipment: Rerating of hoisting equipment will be considered only when absolutely necessary. Prior to performing any lift above the load rating, the equipment manufacturer must be contacted for his approval and direction. The manufacturer must be requested to supply a document granting approval for a limited number of lifts at the new rating and any restrictions involved, such as modifications to be made to the equipment, the number lifts to be made at the new rating, and the test lift load. At all times, the codes governing rerating of hoisting equipment must be observed. If rerating hoisting equipment is necessary and the Company cannot or does not contact the equipment manufacturer as described above, the test weight used in temporarily rerating hoisting equipment for special lifts will be at</p>		

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least equal to 110% of the lift weight. A dynamic load test over the full range of the lift using a weight at least equal to the lift weight shall be performed.		
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		
7.4.1 Rigging that is frayed, worn or otherwise deteriorated shall not be used.		
7.4.2 Hoisting equipment that does not meet manufacturer's specifications shall not be used.		
7.4.3 Equipment and rigging shall be kept clean and free of contaminants that are detrimental to the material being handled.		
7.4.4 Rigging items such as hooks, shackles and turnbuckles that appear to have yielded or are distorted shall not be used.		
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.		
8. RECORDS	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. These records shall be placed with other project records as required by code, standard, specification or project procedures.	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. These records shall be retained with other project records as required by code, standard, specification, or project procedures.	Similar
9. AMERICAN NATIONAL STANDARDS REFERRED TO IN THIS DOCUMENT		
When the following standards referred to in this document are		The new QA program

Packaging, Shipping, Receiving, Storage And Handling Of Items For Nuclear Power Plants (During The Construction Phase) N45.2.2	Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Nuclear Power Plants NQA-1 1994 Subpart 2.2	Comments
<p>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 *N45.2.6 Qualifications of Quality Assurance Personnel for the Construction Phase of Nuclear Power Plants *N45.2.10 Quality Assurance Terms and Definitions M H 6.1 Pictorial Markings for Handling of Goods B30.2.0 Safety Code for Overhead and Gantry Cranes B30.5 Safety Code for Crawler, Locomotive, and Truck Cranes B30.6 Safety Code for Derricks A I 0.5 Safety Requirements for Material Hoists These Standards are being approved by the American National Standards Institute and they should be available early in 1973.</p>		<p>addresses the standards to be applied to the QA program in accordance with NRC regulations.</p>

Housekeeping During the Construction Phase of Nuclear Power Plants N45.2.3-1973	Quality Assurance Requirements for Housekeeping for Nuclear Power Plants NQA-1 1994 Subpart 2.3	COMMENTS
1. INTRODUCTION	1 GENERAL	
1.1 Scope		
<p>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.</p> <p>NRC Regulatory Guide 1.39, Position C.3</p> <p>Although ANSI N45.2.3-1973 is entitled "Housekeeping During the Construction Phase of Nuclear Power Plants," the requirements included in the standard, subject to the provision of Regulatory Position C.2, are considered to be applicable for housekeeping activities occurring during the operations phase that are comparable to those occurring during the construction phase.</p> <p>Generic Statement from the current VA QATR:</p> <p>For operations phase maintenance and modification activities which are comparable in nature and extent to similar activities conducted during the construction phase, the Company shall control these activities under this Operational Quality Assurance Program. Designated modifications may be controlled under a contractor's Quality Assurance Program which has been approved by the Company's Quality Assurance Program. When this Operational Quality Assurance Program or an approved contractor's Quality Assurance Program is used, the Company shall comply with the Regulatory Position established in the guides listed herein in that quality assurance programmatic/administrative requirements included therein (subject to the clarification in this table) shall apply to these maintenance and modification activities even though such requirements may not have been in effect originally. Maintenance or modifications which may affect the function of safety related structures, systems, or components shall be performed in a manner at least equivalent to that specified in original design bases and</p>	<p>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.</p>	<p>Similar introductory statement.</p>

Housekeeping During the Construction Phase of Nuclear Power Plants N45.2.3-1973	Quality Assurance Requirements for Housekeeping for Nuclear Power Plants NQA-1 1994 Subpart 2.3	COMMENTS
requirements, materials specifications, and inspection requirements. A suitable level of confidence in structures, systems, or components on which maintenance or modifications have been performed shall be attained by appropriate inspection and performance testing.		
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. 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.		No similar statement in NQA-1, but these items are addressed within the standard.
The requirements may also be extended to other appropriate parts of nuclear power plants when specified in contract documents. This standard is intended to be used in conjunction with ANSI N45.2, Quality Assurance Requirements For Nuclear Power Plants.	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.	Similar introductory statement. NQA-1, Part I is comparable to ANSI N45.2 as referenced in N45.2.3.
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 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. The requirements are intended to assure that only proper materials, equipment, processes, and procedures are 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.	See Intro to NQA-1-1994, Part II, for general information regarding Applicability.	NQA-1 addresses similar application statements in the Introduction to Part II and in Section 2 of Subpart 2.3 below.

Housekeeping During the Construction Phase of Nuclear Power Plants N45.2.3-1973	Quality Assurance Requirements for Housekeeping for Nuclear Power Plants NQA-1 1994 Subpart 2.3	COMMENTS
1.3 Responsibility		
<p>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 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. 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. 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.</p>	<p>See Intro to NQA-1-1994, Part II, for general information regarding Responsibility.</p>	<p>Similar requirements for responsibility are addressed in the Introduction to Part II of NQA-1.</p>
1.4 Definitions		
<p>The following definition is provided because it is used uniquely in this standard: Generic Statement from the current VA QATR: Definitions in the referenced standards in this table which are not included in ANSI N45.2.10 will be used as clarified in the Company's commitment to Regulatory Guide 1.74.</p>		<p>Definitions are addressed in the Introduction to Part I of NQA-1. Additional definitions are included in the QAPD, Appendix D.</p>
<p>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.</p>		
<p>Other terms and their definitions are contained in ANSI N45.2.10</p>		
1.5 Referenced Documents		
<p>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. NRC Regulatory Guide 1.39, Position C.1 Subdivision 1.5 of ANSI N45.2.3-1973 states that other</p>		<p>The QAPD addresses referenced documents.</p>

Housekeeping During the Construction Phase of Nuclear Power Plants N45.2.3-1973	Quality Assurance Requirements for Housekeeping for Nuclear Power Plants NQA-1 1994 Subpart 2.3	COMMENTS
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 the standard. The specific acceptability of these listed documents has been or will be covered separately in other regulatory guides and in Commission regulations, where appropriate.		
2. GENERAL REQUIREMENTS	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.	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 requirements.
2.4 Personnel Qualifications All personnel working in zone controlled areas shall be familiar with the necessities and requirements for cleanliness control applicable to the various zones. Training programs shall be utilized for this purpose where appropriate.	Personnel working in zone controlled areas shall be familiar with the necessities and requirements for cleanliness control applicable to the various zones. Training programs shall be utilized for this purpose, where appropriate.	Similar requirements.
2.1 Planning	2.1 Planning and Procedures	
The work and the quality assurance requirements for the housekeeping activities at the nuclear power plant site shall be delineated. 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. 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. Methods to be used for the collection, handling, and disposition of records, data, and reports shall be designated.	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.	NQA-1 combines planning and procedures and contains less detail in this section, but addresses procedures for all the subparts in the Introduction to Part II. The result is similar requirements.
N45.2.1, § 2.1, ¶¶ 2-7 -The second paragraph of this section, the descriptions of the 5 Zones, and the Restriction List table is inserted following § 2.2, Procedures and		The Zone descriptions and Restriction List are part of 2.1 Planning in N45.2.3, but 2.2 Classification of

Housekeeping During the Construction Phase of Nuclear Power Plants N45.2.3-1973	Quality Assurance Requirements for Housekeeping for Nuclear Power Plants NQA-1 1994 Subpart 2.3	COMMENTS
Instructions to align with the text of NQA-1.		Cleanness in NQA-1.
N45.2.1, § 2.1, ¶ 8 regarding recording entry and exit of personnel and material is moved down to § 3.1 to align with the text of NQA-1.		
2.2 Procedures and Instructions		
<p>The procedures and instructions for housekeeping practices shall be prepared and may be issued in segments to conform with the project construction schedule. 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. The remaining segments shall be prepared and approved no later than the start of equipment installation work.</p> <p>Clarification from the current VA QATR: (1) Additional clarifications for ANSI N45.2.3-1973 are indicated below for specific Sections: Section 2.2 - Procedures and Instructions: Appropriate procedures will be written and implemented.</p>	<p>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. Other procedures and instructions shall be prepared and approved no later than the start of equipment installation work.</p>	<p>Similar requirements. The clarification from the VA QATR is not being carried forward into the new QAPD.</p>
2.2 Classification of Cleanness		
<p>N45.2.3, § 2.1, ¶2 - Cleanness requirements for housekeeping activities shall be established on the basis of the following zone designations. Time for implementation of the zone designations shall be as required by the construction progress.</p> <p>Clarification from the current VA QATR: ANSI N45.2.3-1973 Section 2.1 — Planning: The Company may choose not to utilize the five-level zone designation system, but will utilize standard janitorial and work practices to maintain a level of cleanliness as delineated in the Company’s Nuclear Operations Industrial Safety & Health Accident Prevention Manual which is equivalent to the requirements contained in the referenced section. Clarifications meet or exceed applicable guides and standards. These clarifications are proposed to perform a twofold function: (A) To translate construction criteria to</p>	<p>Cleanness requirements for housekeeping activities shall be established on the basis of the following zone designations. The timing for implementation of the zone designations shall be as required by the need for cleanness.</p>	<p>Similar requirements. An alternative is proposed with the new QAPD regarding not specifically using the five-level zone designations, but ensuring that an equivalent level of cleanness control is maintained.</p>

Housekeeping During the Construction Phase of Nuclear Power Plants N45.2.3-1973	Quality Assurance Requirements for Housekeeping for Nuclear Power Plants NQA-1 1994 Subpart 2.3	COMMENTS																																																																																																												
<p>operating plant oriented requirements. (B) To reflect experience gained at operational nuclear facilities. It should be noted that where the Company does not specifically implement requirements as delineated herein, the proposed alternatives are reflected in written procedures and policy and contain all necessary elements to assure quality is maintained. Cleanliness will be maintained, consistent with the work being performed, so as to prevent the entry of foreign material into safety-related systems. This will include, as a minimum, documented cleanliness inspections which will be performed prior to system closure. As determined by station management, (e.g., the size of the opening would permit entry of the tools being used) control of personnel, tools, equipment, and supplies will be established when the reactor system is opened for inspection, maintenance or repair. Additional housekeeping requirements will be implemented as required for control of radioactive contamination.</p>																																																																																																														
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Filtered air	Yes	No	No	No	No																																																																																																									
Material precleaning	Yes	Yes	No	No	No																																																																																																									
Material accountability	Yes	Yes	Yes	No	No																																																																																																									
Personnel accountability	Yes	Yes	Yes	No	No																																																																																																									
No use of tobacco or eating	Yes	Yes	Yes	Yes	No																																																																																																									
<p>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. Such areas shall provide for complete outer change of clothing by personnel, including use of shoe</p>	<p>Zone I Areas requiring the highest order of cleanness shall be equipped with a clean clothing change facility at the vestibule or entrance. 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. Material entering this zone shall have been appropriately cleaned</p>	<p>Similar requirements.</p>																																																																																																												

Housekeeping During the Construction Phase of Nuclear Power Plants N45.2.3-1973	Quality Assurance Requirements for Housekeeping for Nuclear Power Plants NQA-1 1994 Subpart 2.3	COMMENTS
covers, head covers, and gloves to protect all equipment surfaces from outside contamination. Material entering this zone shall have been appropriately cleaned prior to entry as specified in ANSI N45.2.1.	prior to entry.	
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.	Similar requirements.
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.	Similar requirements.
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.	Similar requirements.
Zone V - Unrestricted construction areas requiring good construction site housekeeping practices only.	Zone V. Unrestricted construction areas requiring good construction site housekeeping practices only.	Similar requirements.
2.3 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 instruction followed in performing the task, and the identification of the following:		Similar requirements addressed in NQA-1, Part I and the Introduction to Part II.
<ol style="list-style-type: none"> 1. Conditions encountered which were not anticipated, including nonconformance. 2. Identity of inspector or tester. 3. Completion date. 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.		Similar requirements addressed in NQA-1, Part I and the Introduction to Part II.
3. REQUIREMENTS	3 REQUIREMENTS	
3.1 Control of Site Area	3.1 Control of Site Area	
Areas for specific activities shall be assigned and regulated. 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. Personnel entrance to	Areas for specific activities shall be assigned and regulated. 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. Personnel entrance to	Similar requirements.

Housekeeping During the Construction Phase of Nuclear Power Plants N45.2.3-1973	Quality Assurance Requirements for Housekeeping for Nuclear Power Plants NQA-1 1994 Subpart 2.3	COMMENTS
controlled areas, admission of visitors to the work site, and identification of all personnel shall be regulated in accordance with established procedures and regulations.	controlled areas, admission of visitors to the work site, and identification of all personnel shall be controlled in accordance with established procedures and instructions.	
N45.2.1, § 2.1, ¶ 8 - 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	Similar requirements.
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.	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.	Similar requirements.
3.2 Control of Facilities	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. Atmospheric control shall be provided where necessary.	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. Atmospheric control shall be provided where necessary.	Similar requirements.
<p>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. Appropriate control measures shall be provided through utilization of such items as log books and tethered tools.</p> <p>Clarification from the current VA QATR: Section 3.2 - Control of Facilities: The Company may choose not to utilize the five-level zone designation system, but will utilize the Company's Nuclear Operations Industrial Safety & Health Accident Prevention Manual to maintain a level of cleanliness commensurate with the requirements of this section. Cleanliness will be maintained, consistent with the work being performed, so as to prevent the entry of foreign material into safety-related systems. This will include, as a minimum, documented cleanliness inspections which will be performed prior to system closure. As necessary, (e.g., the size of the opening would permit entry</p>	<p>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. Appropriate control measures shall be provided through utilization of such items as log books and tethered tools.</p>	<p>Similar requirements. An alternative is proposed with the new QAPD regarding not specifically using the five-level zone designations, but ensuring that an equivalent level of cleanliness control is maintained.</p>

Housekeeping During the Construction Phase of Nuclear Power Plants N45.2.3-1973	Quality Assurance Requirements for Housekeeping for Nuclear Power Plants NQA-1 1994 Subpart 2.3	COMMENTS
of the tools being used) control of personnel, tools, equipment, and supplies will be established when major portions of the reactor system are opened for inspection, maintenance or repair. Additional housekeeping requirements will be implemented as required for control of radioactive contamination.		
3.2.1 Cleanness.	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. 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. 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. Such excess material shall not be allowed to accumulate and create conditions that will adversely affect quality. The disposal of cleaning chemicals shall be accomplished so additional hazards are not created at the disposal site.	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. 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. 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. Such excess material shall not be allowed to accumulate and create conditions that will adversely affect quality. The disposal of cleaning chemicals shall be accomplished so additional hazards are not created at the disposal site.	Similar requirements.
3.2.2 Environment.	3.2.2 Environment.	
Areas of activity shall be adequately lighted, ventilated, protected, and accessible as appropriate for the work being performed. Temporary lighting may be utilized but shall be installed and maintained to provide good visibility. Ventilation shall be provided where necessary to prevent accumulation of dust, noxious fumes, and temperature extremes. Adequate working space for construction personnel shall be provided utilizing proper work stages and platforms having accessibility by stairs or ladders. 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.	Areas of activity shall be adequately lighted, ventilated, protected, and accessible as appropriate for the work being performed. Temporary lighting may be utilized but shall be installed and maintained to provide good visibility. Ventilation shall be provided where necessary to prevent accumulation of dust, noxious fumes, and temperature extremes. Adequate working space for construction personnel shall be provided utilizing proper work scaffolds and platforms having accessibility by stairs or ladders. 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	Similar requirements.

Housekeeping During the Construction Phase of Nuclear Power Plants N45.2.3-1973	Quality Assurance Requirements for Housekeeping for Nuclear Power Plants NQA-1 1994 Subpart 2.3	COMMENTS
	being performed.	
3.2.3 Fire Protection and Prevention.	3.2.3 Fire Protection and Prevention.	
<p>Equipment and instructions for the protection from and prevention of, damage by fire shall be provided in accordance with the NFPA National Fire Codes, Volume 4, Building Construction Facilities. 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 shall include plans for provision of water supplies, hydrants, automatic sprinklers, access for fire fighting, and distribution of extinguishers and fire fighting equipment.</p> <p>NRC Regulatory Guide 1.39, Position C.2 Subdivision 3.2.3 of ANSI N45.2.3-1973 includes general guidelines and requirements for fire protection and prevention. The requirements and guidelines of Subdivision 3.2.3 are not considered a part of this regulatory guide, since this subject is addressed separately in more detail in other NRC documents. Thus, a commitment to follow this regulatory guide does not imply a commitment to follow the guidelines and requirements of Subdivision 3.2.3.</p>	<p>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. 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 shall include plans for provision of water supplies, hydrants, automatic sprinklers, access for fire fighting, and distribution of extinguishers and fire fighting equipment.</p>	<p>Similar requirements.</p>
<p>Fire watches during and immediately following welding operations should be specified.</p>	<p>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.</p>	<p>Fire watch/surveillance requirements are clarified in NQA-1-1994.</p>
<p>Fire protection facilities shall be in service beginning with the initial stages of permanent construction. Pre-fire planning should be considered as a requirement of the fire protection procedures or instructions which shall include evacuation of confined areas.</p>	<p>Fire protection facilities shall be in service beginning with the initial stages of permanent construction. Pre-fire planning shall be conducted as a requirement of the fire protection procedures or instructions, which shall include evacuation of confined areas.</p>	<p>Similar requirements.</p>
3.3 Materials and Equipment	3.3 Material and Equipment	
<p>Materials and equipment delivered to the work area shall be</p>	<p>Materials and equipment delivered to the work area shall be</p>	<p>Similar requirements. N45.2.2 is</p>

Housekeeping During the Construction Phase of Nuclear Power Plants N45.2.3-1973	Quality Assurance Requirements for Housekeeping for Nuclear Power Plants NQA-1 1994 Subpart 2.3	COMMENTS
<p>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.</p> <p>The receiving, storage, and handling activities required by this standard shall be performed as specified in ANSI N45.2.2. The cleaning of important parts for the plant that is necessary during these activities shall be performed as specified in ANSI N45.2.1.</p> <p>Clarification from the current VA QATR: Section 3.3 - Materials and Equipment: See Generic Statement which prefaces this table. (Copied on page 1 of this particular comparison table.)</p>	<p>so positioned, or protected when necessary, to assure that the quality of the item will not be degraded by the construction activity. 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.</p>	<p>replaced with Subpart 2.2 of NQA-1. Clarification not needed for the new QAPD.</p>
<p>3.4 Construction Tools, Supplies, and Equipment</p> <p>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. 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.</p> <p>Clarification from the current VA QATR: Section 3.4 - Construction Tools, Supplies and Equipment: See Generic Statement which prefaces this table.</p>	<p>3.4 Construction Tools, Supplies, and Equipment</p> <p>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. 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.</p>	<p>Similar requirements. Clarification not needed for the new QAPD.</p>
<p>3.5 Surveillance, Inspections, and Examinations</p> <p>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. These inspections and examinations shall include the following as appropriate:</p>	<p>3.5 Surveillance and Inspections</p> <p>Periodic inspection of work areas and construction practices shall be performed at scheduled intervals to assure adequacy of cleanness and housekeeping practices. These inspections shall include the following, as appropriate:</p>	<p>Similar requirements. Throughout subsection 3.5, the term examination is not used in NQA-1 since it is a part of inspection. The term inspection is favored by the standard.</p>
<p>1. Examination of construction site roads, access ways, and ramps for conditions that may result in damage to items</p>	<p>(a) inspection of construction site roads, access ways, and ramps for conditions that may result in damage to items</p>	<p>Similar requirements. Clarification not needed for the new</p>

Housekeeping During the Construction Phase of Nuclear Power Plants N45.2.3-1973	Quality Assurance Requirements for Housekeeping for Nuclear Power Plants NQA-1 1994 Subpart 2.3	COMMENTS
being transported or handled. Clarification from the current VA QATR: Section 3.5 - Surveillance, Inspections and Examination: Subparagraph (1) See Generic Statement which prefaces this table.	being transported or handled;	QAPD.
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.	(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	Similar requirements. Slightly more detail regarding hazardous materials in NQA-1.
3. Inspection of work areas for maintenance of environmental conditions within specified limits.	(c) inspection of work areas for maintenance of environmental conditions within specified limits;	Similar requirements.
4. Surveillance over installed items to assure the adequacy of: (a) maintenance of protection. (b) preservation of precautionary signs. (c) preservation of item identity. (d) protection from fire, weather, movement of materials or equipment and other factors which may result in damage to installed items.	(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 requirements.
Where these requirements duplicate the requirements of other standards such as ANSI N45.2.1, duplicate activities and reports are not required.		Not a requirement.
4. RECORDS	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. Final disposition of records shall be in accordance with ANSI N45.2.9.	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). These records shall be retained with other project records as required by code, standard, specification, or project procedures.	Similar requirements. ANSI N45.2.9 is replaced with Basic Requirements 17 and Supplemental Requirements 17S-1 for NQA-1.

Housekeeping During the Construction Phase of Nuclear Power Plants N45.2.3-1973	Quality Assurance Requirements for Housekeeping for Nuclear Power Plants NQA-1 1994 Subpart 2.3	COMMENTS
5. REVISIONS OF AMERICAN NATIONAL STANDARDS REFERRED TO IN THIS DOCUMENT		
<p>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.</p> <p>A10.2-1944 Safety Code for Building Construction</p> <p>N45.2 Quality Assurance Program Requirements for Nuclear Power Plants</p> <p>N45.2.1 Cleaning of Fluid Systems and Associated Components During the Construction Phase of Nuclear Power Plants</p> <p>N45.2.2 Packaging, Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants (During the Construction Phase)</p> <p>N45.2.9 Requirements for Collection, Storage and Maintenance of Quality Assurance Records</p> <p>N45.2.10 Quality Assurance Terms and Definitions</p>		<p>The QAPD addresses the standards for the program.</p>

Installation, Inspection, and Testing of Requirements for Instrumentation and Electric Equipment During the Construction of Nuclear Power Generating Stations N45.2.4-1972/IEEE Std 336-1971	NQA-1 1994 Subpart 2.4 IEEE Standard Installation, Inspection, and Testing Requirements for Power, Instrumentation, and Control Equipment at Nuclear Facilities ANSI/IEEE Std 336-1985	COMMENTS
Reg. Guide 1.30 8/72 Position C.1 states: .ANSI N45.2.4-1972 should be used in conjunction with ANSI N45.2-1971, "Quality Assurance Program Requirements for Nuclear Power Plants." (It is expected that future revisions of ANSI N45.2.4-1972 will include this provision.)		NQA-1-1994 is used with Part I of NQA-1-1994 that is comparable to the Quality Assurance Program requirements of N45.2-1971.
1. INTRODUCTION	1. Introduction	NQA-1, Subpart 2.4 consists of ANSI/IEEE Std. 336-1985 IEEE Standard Installation, Inspection, and Testing Requirements for Power, Instrumentation, and Control Equipment at Nuclear Facilities.
1.1 Scope	1.1 Scope	
<p>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 phases of a nuclear power generating station. 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.</p> <p>Reg. Guide 1.30 8/72 Position C.3 states: Although subdivision 1.1 of ANSI N45.2.4-1972 states that the requirements promulgated apply during the construction phase of a nuclear power plant, these requirements are also to be considered applicable for the installation, inspection, and testing of instrumentation and electric equipment during the operation phase of a nuclear power plant.</p>	<p>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. 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.</p> <p>The intent of this standard is to establish requirements for safety systems equipment. (Safety systems equipment is defined in IEEE Std 603-1980 [5]1) However, this standard may also be applied to non-safety systems equipment.</p>	Similar requirements. Regulatory Position incorporated into the standard.

Installation, Inspection, and Testing of Requirements for Instrumentation and Electric Equipment During the Construction of Nuclear Power Generating Stations N45.2.4-1972/IEEE Std 336-1971	NQA-1 1994 Subpart 2.4 IEEE Standard Installation, Inspection, and Testing Requirements for Power, Instrumentation, and Control Equipment at Nuclear Facilities ANSI/IEEE Std 336-1985	COMMENTS
<p>The following is a clarification made in the current VA QATR: Regulatory Guide 1.30— Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electric Equipment (8/72). Endorses ANSI N45.2.4-1972 The Operational Quality Assurance Program complies with this guide with the following clarifications and alternatives:</p> <p>(1) See Generic Statement which prefaces this table with regard to construction related guides, standards, and instructions. Generic Statement from the current VA QATR:</p> <p>For operations phase maintenance and modification activities which are comparable in nature and extent to similar activities conducted during the construction phase, the Company shall control these activities under this Operational Quality Assurance Program. Designated modifications may be controlled under a contractor’s Quality Assurance Program which has been approved by the Company’s Quality Assurance Program. When this Operational Quality Assurance Program or an approved contractor’s Quality Assurance Program is used, the Company shall comply with the Regulatory Position established in the guides listed herein in that quality assurance programmatic/administrative requirements included therein (subject to the clarification in this table) shall apply to these maintenance and modification activities even though such requirements may not have been in effect originally. Maintenance or modifications which may affect the function of safety related structures, systems, or components shall be performed in a manner at least equivalent to that specified in original design bases and requirements, materials specifications, and inspection requirements. A suitable level of confidence in structures, systems, or components on which maintenance or modifications have been performed shall be attained by appropriate inspection and</p>		

Installation, Inspection, and Testing of Requirements for Instrumentation and Electric Equipment During the Construction of Nuclear Power Generating Stations N45.2.4-1972/IEEE Std 336-1971	NQA-1 1994 Subpart 2.4 IEEE Standard Installation, Inspection, and Testing Requirements for Power, Instrumentation, and Control Equipment at Nuclear Facilities ANSI/IEEE Std 336-1985	COMMENTS
performance testing.		
1.1.1		
<p>In addition to the Class I and Class IE systems, the requirements also apply to the following auxiliary equipment that are a part thereof.</p> <ol style="list-style-type: none"> 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 		<p>This specific list is not included in the 1985 edition, but the above paragraph addresses safety systems equipment that, based on the definition referenced, would include the items in this list.</p>
1.1.2		
<p>These requirements may also be extended to other appropriate parts of nuclear power generating stations when specified in contract documents.</p>		<p>Not a requirement.</p>
1.1.3	1.1.1	
<p>This standard does not set forth specific requirements for the following, though related to the above equipment and systems:</p> <ol style="list-style-type: none"> 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 <p>For applicable codes on the above refer to Section 9.</p>	<p>This standard does not set forth specific requirements for the following, though they are related to the above equipment and systems</p> <ol style="list-style-type: none"> 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 	<p>Similar exclusions, these items are addressed by other standards or the QAPD.</p>

Installation, Inspection, and Testing of Requirements for Instrumentation and Electric Equipment During the Construction of Nuclear Power Generating Stations N45.2.4-1972/IEEE Std 336-1971	NQA-1 1994 Subpart 2.4 IEEE Standard Installation, Inspection, and Testing Requirements for Power, Instrumentation, and Control Equipment at Nuclear Facilities ANSI/IEEE Std 336-1985	COMMENTS
	7) Periodic testing and maintenance after initial operation 8) Receiving inspection and test 9) Non-destructive examination when required	
	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]. During the operations phase this standard shall be used with the applicable portions of ANSI/ANS 3.2-1982 [3]. The numbers in brackets correspond to those of the references listed in Section 2.	NQA-1-1994 replaces NQA-1-1983 and NQA-2-1983 for the Dominion QAPD In addition, Dominion's commitment to other standards is addressed in the QAPD, Appendix C.
1.2 Applicability	1.2 Applicability	
The requirements set forth in this standard apply to the work of any organization that participate 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. 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. For supplementary requirements applicable to the construction phase of multi-unit stations, including expansions to existing stations, refer to Appendix A.	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. 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.	Similar requirements. Supplementary requirements for construction of multi-unit stations and operating plants is addressed in Section 10 of the 1985 edition.
1.3 Responsibility	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. 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	It is the responsibility of the organization invoking this standard to identify the equipment and systems to which this standard is applicable. 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. The work of establishing practices and procedures and providing the resources, in terms of personnel, equipment, and	Similar requirements.

Installation, Inspection, and Testing of Requirements for Instrumentation and Electric Equipment During the Construction of Nuclear Power Generating Stations N45.2.4-1972/IEEE Std 336-1971	NQA-1 1994 Subpart 2.4 IEEE Standard Installation, Inspection, and Testing Requirements for Power, Instrumentation, and Control Equipment at Nuclear Facilities ANSI/IEEE Std 336-1985	COMMENTS
<p>organizations, and such delegation also shall be documented. It is the responsibility of each organization participating in site construction activities to comply with procedures and instructions issued for the project.</p>	<p>services, to implement the requirements of this standard, may be delegated to other organizations. Such delegation shall be documented. In any case, the organization invoking this standard shall retain responsibility for overall program effectiveness.</p>	
<p>1.4 Definitions</p>		
<p>The following definitions are provided to assure a uniform understanding of select terms as they are used in this standard.</p>		<p>NQA-1 contains definitions in Part I, Introduction.</p>
<p>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.</p>		
<p>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.</p>		
<p>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.</p>		
<p>Set Point - A predetermined level at which a bistable device changes state to indicate that the quantity under surveillance has reached the selected value.</p>		
<p>Lay-Up - Idle condition of equipment and systems during and after installation, with protection measures applied as appropriate.</p>		
<p>1.5 Referenced Documents</p>	<p>2. References</p>	
<p>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 referenced or described in Section 9 of this standard.</p>	<p>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. [1] ANSI/ASME NQA-1-1983, Quality Assurance Program Requirements for Nuclear Power Plants .</p>	<p>Commitment to specific editions of standards is controlled through the QAPD.</p>

Installation, Inspection, and Testing of Requirements for Instrumentation and Electric Equipment During the Construction of Nuclear Power Generating Stations N45.2.4-1972/IEEE Std 336-1971	NQA-1 1994 Subpart 2.4 IEEE Standard Installation, Inspection, and Testing Requirements for Power, Instrumentation, and Control Equipment at Nuclear Facilities ANSI/IEEE Std 336-1985	COMMENTS
	[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.	
2. GENERAL REQUIREMENTS	3. General Requirements	
Measures shall be established and implemented for documenting installation, inspection, and testing operations to verify conformance to specified requirements.	Measures shall be established and implemented for planning and control of installation, inspection, and testing activities to verify conformance to specified requirements.	Similar requirement.
2.2 Prerequisites	3.1 Prerequisites	
The following conditions shall have been met as required by other standards before the requirements set forth in this standard are applied.		Not specifically addressed in the 1985 standard.
1) Qualification of personnel assigned to the construction phase has been in accordance with the requirements of appropriate codes and standards.		Section 3.7 of the 1985 standard covers Personnel Qualification
2) Systems have been designed and engineered and equipment has been specified in accordance with the published applicable standards and specifically within the framework of the Quality Assurance program described in the Safety Analysis Report.		Not specifically addressed in the 1985 standard.
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.		Not specifically addressed in the 1985 standard.

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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.		Not specifically addressed in the 1985 standard.
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 requirement.
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 requirement.
2.1 Planning	3.2 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. Planning shall take into account the need for the preparation and control of procedures and work instructions as necessary to comply with the requirements for installation, inspection, and testing of components and systems. 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, and that they can be accomplished as specified, and that time and resources are sufficient to accomplish the required actions.	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. 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 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.	Similar requirement.
The following is a clarification made in the current VA QATR: (2) Section 2.1 — Planning requirements, as		This clarification is not required to be carried forward to the new QAPD. It is

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<p>determined by station management, will be incorporated into maintenance and modification procedures. Clarifications and alternatives meet or exceed applicable guides and standards. These clarifications to ANSI N45.2.4-1972 are required to ensure that QA program continuity is maintained. In actuality these clarifications have been extracted from other standards and guides and are considered more conservative. These clarifications also insure that only one standard or guide is committed to for its applicable circumstance</p>		<p>covered by Subsection 1.3 of the standard.</p>
2.3 Procedures and Instructions	3.3 Procedures and Instructions	
<p>Installation, inspection, and test procedures and work instructions shall be prepared and documented for those activities falling within the scope of this standard.</p>	<p>Procedures shall be prepared and documented as determined by the planning in 3.2. These procedures and instructions may be in the form of manuals or drawings.</p>	<p>Similar requirement.</p>
<p>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:</p>	<p>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:</p>	<p>Similar requirement.</p>
<ul style="list-style-type: none"> (1) Installation specifications (2) Inspection and test objectives (3) Precautions to avoid component or system 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 	<ul style="list-style-type: none"> 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 	<p>Similar requirement, references and other pertinent items are added to the list.</p>

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	14) Other pertinent items	
	The above items shall be included as a checklist and shall be marked as required or not appropriate when preparing procedures or instructions.	New requirement. Alternative proposed to administrative controls in procedures and instruction in lieu of a checklist.
2.4 Results	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 instruction followed in performing the task, and the identification of the following:	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:	Similar requirement.
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 testor 3) Completion date	Similar requirement.
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.	Similar requirement.
2.5 Measuring and Test Equipment	3.5 Measuring and Test Equipment	
2.5.1 Selection.		
Inspection and testing equipment with acceptable accuracy for performing the required function shall be selected. When general voltage levels, flow directions, or other parameters are checked, an instrument without high precision may be used. 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. Use shall be made of approved industry standards relating to measuring procedures. Test equipment and/or apparatus supplying electrical, mechanical, or other test inputs shall have adequate capacity	Measuring and test equipment used to determine compliance with specifications shall be controlled in accordance with the requirements of IEEE Std 498-1985 [4].	NQA-1 addresses M&TE in Subpart 2.16 (IEEE Std 498-1985).

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and be compatible with items under test so that the results will not be distorted.		
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. If no national standards exists, the basis for calibration shall be documented. Records of the calibrations shall be maintained and equipment suitably marked to indicate date of next required calibration. 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. Test equipment found to be out of calibration shall be clearly identified as such.		NQA-1 addresses in Subpart 2.16.
2.6 Nonconforming Items	3.6 Nonconforming Items	
Defects, deficiencies, discrepancies, or other nonconforming situations shall be resolved in accordance with established procedures. These procedures shall provide for identifying, documenting, and obtaining authorization for resolving each nonconforming situation.	Defects, deficiencies, discrepancies, or other nonconforming situations shall be resolved in accordance with established procedures. These procedures shall provide for identifying, documenting, and obtaining authorization for resolving each nonconforming situation.	Similar requirement.
	3.7 Personnel Qualification	
	Personnel performing the verifications required by this standard shall be qualified in accordance with an approved quality assurance program.	Qualification is a prerequisite under N45.2.4, Subsection 2.2, item 1.
3. PRECONSTRUCTION VERIFICATION	4. Preinstallation Verification	
While it is recognized that the requirements for initial receipt inspections and storage are covered by another standard, ANSI N45.2.2, it is necessary to verify that the quality of an item has not suffered during the interim period. It is not intended to duplicate inspections but rather to verify that items are in a satisfactory condition for installation. The verification	Verifications shall be performed just prior to installation.	

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shall include:		
2. Verification that approved procedures, instruction manuals, and/or any special work instructions if required for specific equipment are available	1) The following, relating to the specific equipment to be installed, shall be available at the construction site in legible form: a) The latest applicable approved-for-construction drawings b) Installation specifications, procedures, or any special work instructions	Similar requirements, 1985 edition includes construction drawings and removes approved instruction manuals.
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) Identification of materials and equipment in accordance with the latest approved-for-construction drawings, equipment lists, and specifications	Similar requirements.
3. Checking of records of protective measures maintained during storage for conformance to storage requirements	3) Documentation of protective measures taken during storage	Similar 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	4) Physical integrity by visual examination of materials and equipment for damage, corrosion, contamination, and condensation	Similar requirements.
The following is a clarification made in the current VA QATR: (3) Section 3 — Preconstruction Verification: (a) verification is required only for the modification(s) (b) will be implemented with the clarification that “approved instruction manuals” shall be interpreted to mean the manuals provided by the supplier as required by the procurement order. These manuals will not be reviewed and approved, per se, by the Company; (c) no special checks will be made by the person withdrawing a replacement part from the warehouse-equivalent controls are assured by compliance with ANSI N45.2.2 as set forth in this table; and (d) will be complied with, as determined by station management as part of the maintenance/modification program.		Based on the requirements of the new standard, this clarification is not needed for the new QAPD.
4. INSTALLATION	5. Installation	
	5.1 Equipment Placement	
Equipment shall be located, installed, assembled, and/or connected in strict accordance with the following as applicable:	Equipment shall be located, installed, assembled, and connected in strict accordance with the following:	Similar requirements.

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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 requirements.
The following is a clarification made in the current VA QATR: Section 4 — Installation: instructions will be implemented by inclusion, as determined by station management, in the appropriate maintenance or modification procedure for safety-related items. Standard Company maintenance practices require that care be exercised in the six areas listed whether a procedure is required or not.		Clarification not needed for the new QAPD.
	5.2 Precautions	
Care shall be especially exercised in following the provisions of the above documents for operations such as: 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	Care shall be exercised in following the provisions of the documents listed in 5.1 for operations such as: 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 requirements, but the 1985 edition has been updated to include additional appropriate items based on operating experience and regulatory requirements.
5. VERIFICATION DURING CONSTRUCTION	6. Verification During Installation	
	Verification during installation shall include inspections and tests performed in accordance with the QA program requirements.	In context with the below subsections, this is similar to the N45.2.4 standard.

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5.1 Inspections	6.1 Inspections	
Surveillance of construction activities shall include inspections of the work areas in progress to assure conformance to applicable requirements. Inspections shall include the following, as appropriate:	Inspections performed during installation shall include the following:	Similar requirement, reference to surveillance is omitted and just the term inspection is used.
5.1.1 Inspections to Verify Correctness of Installation.	6.1.1 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.	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 requirement.
Such inspections shall include, as appropriate, verification of: <ol style="list-style-type: none"> (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 	Inspections shall include such items as verification of: <ol style="list-style-type: none"> 1) 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 requirement, but the 1985 edition includes additional items that are representative of industry operating experience.
5.1.2 Inspections to Verify Housekeeping	6.1.2 Inspections to Verify Housekeeping and Protective Measures	
Inspections shall be made to verify adequacy of housekeeping,	Inspections shall be performed to verify the adequacy of	Similar requirement, the 1985

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<p>in work areas. Adequacy of barriers and protection covers shall be evaluated to assure that items will not be damaged as a result of adjacent construction activity. Adequacy of protection measures shall be evaluated to assure that equipment being used for testing will not be damaged.</p>	<p>housekeeping in work areas [2]. Inspections shall be performed on a regular schedule and properly documented to verify that the following protective measures are adequate.</p> <ol style="list-style-type: none"> 1) Protective measures applied for lay-up during construction are in accordance with procedures or specifications 2) Protective measures to prevent damage as a result of adjacent activity 3) Protective measures to prevent damage to measuring and test equipment during field use 	<p>standard more detail on the inspection requirements.</p>
<p>5.1.3 Inspection of Temporary Conditions.</p>	<p>6.1.3 Inspections of Temporary Conditions</p>	
<p>Inspections shall be made to verify adequacy of protective measures applied for lay-up 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.</p>	<p>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.</p>	<p>Similar requirement, protective measures addressed in 6.1.2 above for the 1985 standard.</p>
<p>The following is a clarification made in the current VA QATR: Section 5.1 — Inspections: including subsections 5.1.1, 5.1.2, and the first sentence in 5.1.3, will be implemented as set forth in Section 17.2.10 of the Operational QA Program. The inspection program will incorporate, as determined by station management, those items listed in these subsections. The remaining sentence in 5.1.3 is covered in equivalent detail in the Company’s commitment to ANSI N18.7, section 5.2.6; the requirements as set forth in that commitment will be implemented in addition to the requirements stated here.</p>		<p>Clarification deemed not necessary for the new QAPD. Inspections will be conducted in accordance with the planning requirements of the standard and the inspection program commitment.</p>
<p>5.2 Tests</p>	<p>6.2 Tests</p>	
<p>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 requirement. 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</p>	<p>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.</p>	<p>The 1985 standard is not as specific about the tests, rather it refers back to those identified during planning.</p>

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<p>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.</p>		
<p>The following is a clarification made in the current VA QATR: Section 5.2 — Tests: including subsections 5.2.1 through 5.2.3, will be implemented as set forth in Sections 17.2.3 and .11 of the Operational QA Program. The test program will consider the elements outlined in this Section, as determined by station management, when developing test requirements for inclusion in maintenance and modification procedures. In some cases, testing requirements may be met by post-installation surveillance testing in lieu of a special post-installation test. Where elements of Section 5.2 are not being met they shall be documented and justified.</p>		<p>Clarification deemed not necessary for the new QAPD. Tests will be conducted in accordance with the planning requirements of the standard and the test program commitment.</p>
<p>Tests during construction shall include the following:</p>		
<p>5.2.1 Electrical Tests.</p>	<p>6.2.1 Electrical Tests</p>	
<p>The following electrical tests shall be performed: 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, enunciators and alarms, controls and interlocks 3. Voltage breakdown tests on liquid insulation 4. Over-potential tests as specified 5. Insulation resistance measurements as specified When over-potential tests are performed, the values shall conform to the applicable codes and standards. The manufacturers recommendations shall always be considered.</p>	<p>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 When overpotential tests are performed, the manufacturers' recommendations shall be considered.</p>	<p>Similar requirement.</p>

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5.2.3 Physical and Chemical Tests.	6.2.2 Physical and Chemical Tests	
<p>These tests shall include, as appropriate:</p> <ol style="list-style-type: none"> 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 <p>These tests shall be in accordance with the applicable codes in Appendix B.</p>	<ol style="list-style-type: none"> 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. 	<p>Similar requirement.</p>
5.2.2 Mechanical Tests.	6.2.3 Mechanical Tests	
<p>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. 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. Manufacturer's tests on fabricated items may be accepted for equipment not disturbed during the construction phase. These tests shall be in accordance with the applicable codes and standards. If equipment is assembled at the construction site, tests shall be conducted after the assembly is completed even though the components may have been previously tested.</p>	<p>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. 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.</p>	<p>Similar requirement. Manufacturer's test statement is addressed in Section 6.2 of the 1985 standard.</p>
6. POST-CONSTRUCTION VERIFICATION	7. Post-Installation Verification	
6.1 Inspection	7.1 Inspections	
<p>Installed equipment and systems shall be inspected to verify the following:</p> <ol style="list-style-type: none"> 1. That equipment and materials have not sustained damage during installation 2. That good and proper workmanship has prevailed 	<p>Installed equipment and systems shall be inspected to verify that:</p> <ol style="list-style-type: none"> 1) Equipment and materials have not sustained damage during installation 2) Good and proper workmanship has prevailed 	<p>Similar requirement.</p>

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<p>3. That the installation has been made in accordance with specified requirements</p> <p>4. That all nonconforming items have been satisfactorily resolved</p> <p>5. That appropriate protective measures are applied for lay-up after installation</p> <p>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 To satisfy the above objectives, inspections defined in 5.1 shall be repeated, as appropriate.</p>	<p>3) The installation has been made in accordance with specified requirements</p> <p>4) All nonconforming items have been satisfactorily resolved</p> <p>5) Appropriate protective measures are applied for lay-up after installation</p> <p>6) All temporary conditions, such as jumpers, lifted leads, bypass lines, and temporary setpoints, have been clearly identified so that subsequent restoration can be ascertained prior to placing the items in service.</p> <p>To satisfy the above objectives, it may be necessary to repeat some of the inspections defined in 6.1.</p>	
6.2 Tests	7.2 Tests	
<p>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. 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. In these instances, a documented notice shall be prepared stating the substitutions that existed for the test. 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. Where the installed equipment is not adequate for the purpose of conducting tests, special measuring instruments and simulating devices shall be used. Test equipment used shall have adequate capacity and be compatible with system under test so that the results will not be distorted.</p>	<p>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. 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. 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. 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. Where the installed equipment is not adequate for the purpose of conducting tests, special measuring instruments and simulating devices shall be used. Test equipment used shall have adequate capacity and tolerance and be compatible with the system under test.</p>	<p>Similar requirement.</p>
6.2.1 Equipment Tests.	7.2.1 Equipment Tests	
<p>Tests shall be performed to verify that the quality of installed equipment has not deteriorated during the construction phase.</p>	<p>Tests shall be performed to demonstrate that the installed equipment is in an acceptable condition to be energized where</p>	<p>Similar requirement. Alternative for labeling</p>

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<p>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 shall be made to assure that instrumentation and control channels are properly calibrated. In addition, specific tests shall be made at critical levels such as "set points" in a manner simulating the approach toward the set point. These calibrations shall be made with these devices in their normal positions if the calibration is dependent upon location or attitude. Tests shall be made to determine that proper response is obtained over the operating range of the device. Particular attention shall be given to verifying independence and dependence, as appropriate, of the elements of the systems. Items requiring calibration shall be tagged or labeled on completion indicating date of calibration and identity of person that performed the calibration.</p> <p>The following is a clarification made in the current VA QATR: (5) Section 6.2.1 — Equipment Tests: The last paragraph of this section deals with tagging and labeling. The Company will comply with an alternate last paragraph which reads: "Each safety-related item of process instrumentation is identified with a unique number. This number is utilized in instrument maintenance records so that current calibration status, including data such as the date of the calibration and identity of the person that performed the calibration, can be readily determined. Such information may also be contained on tags or labels which may be attached to installed instrumentation."</p>	<p>manufacturers' tests or calibrations cannot be accepted (see 6.2). 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). Tests shall be made to assure that instrumentation and control channels are properly calibrated. If the calibration is dependent upon location or orientation, then calibrations shall be made with these devices in their normal positions. Tests shall be made to determine that proper operation is obtained over the range of the device. Particular attention shall be given to verifying independence and dependence, as appropriate, of the elements of the systems. 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.</p>	<p>installed measuring and test equipment addressed in the new QAPD.</p>
<p>6.2.2 System Tests.</p>	<p>7.2.2 System Tests</p>	
<p>These tests shall be made to verify that all parts of a system properly coordinate with each other. Tests shall be made with attention given to demonstrating required independence and dependence of subsystems. Consideration shall be given to</p>	<p>Tests shall be made to verify that all parts of a system properly coordinate with each other. Tests shall be made with attention given to demonstrating required independence and dependence of subsystems. Consideration shall be given to the need for</p>	<p>Similar requirement.</p>

Installation, Inspection, and Testing of Requirements for Instrumentation and Electric Equipment During the Construction of Nuclear Power Generating Stations N45.2.4-1972/IEEE Std 336-1971	NQA-1 1994 Subpart 2.4 IEEE Standard Installation, Inspection, and Testing Requirements for Power, Instrumentation, and Control Equipment at Nuclear Facilities ANSI/IEEE Std 336-1985	COMMENTS
<p>demonstrating freedom from unwanted or harmful effects of conducted or induced electrical noise. 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. 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. 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</p>	<p>demonstrating freedom from unwanted or harmful effects of Conducted or induced electrical noise. 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. 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. 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.</p>	
<p>The following is a clarification made in the current VA QATR: (4) Section 6 — Post Construction Verification: is not generally considered applicable at operating facilities because of the scope of work and the relatively short interval between installation and operation. Where considered necessary by station management, the elements described in this section will be used in the development and implementation of inspection and testing programs as described in Sections 17.2.3, .10, and .11 of the Operational QA Program.</p>		<p>Clarification deemed not necessary for the new QAPD.</p>
<p>7. DATA ANALYSIS AND EVALUATION</p>	<p>8. Data Analysis and Evaluation</p>	
<p>Procedures shall be established for processing inspection and test data and their analysis and evaluation. These procedures shall include acquisition and reduction of inspection and test data for prompt evaluation against acceptance criteria, operating limits and performance standards.</p>	<p>Procedures shall be established for processing inspection results and analyzing and evaluating test data. These procedures shall include requirements for reduction of inspection and test data for review or evaluation against acceptance criteria.</p>	<p>Similar requirement.</p>
<p>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. The data shall be analyzed and evaluated to verify completeness of results, achievement of inspection and test objectives, and operational proficiency of equipment and</p>	<p>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.</p>	<p>Similar requirement, but does not require "on-the-spot" evaluation. Clarification from the current VA deemed not necessary for the new QAPD.</p>

Installation, Inspection, and Testing of Requirements for Instrumentation and Electric Equipment During the Construction of Nuclear Power Generating Stations N45.2.4-1972/IEEE Std 336-1971	NQA-1 1994 Subpart 2.4 IEEE Standard Installation, Inspection, and Testing Requirements for Power, Instrumentation, and Control Equipment at Nuclear Facilities ANSI/IEEE Std 336-1985	COMMENTS
<p>systems; to identify additional inspection and/or tests required; and to identify necessary changes to the installation inspection or test procedures. 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.</p> <p>The following is a clarification made in the current VA QATR: (6) Section 7 — Data Analysis and Evaluation: will be implemented as stated herein after adding the clarifying phrase “when determined by station management” at the beginning of that paragraph.</p>		
8. RECORDS	9. Records	
<p>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. These shall be placed with other project records as required by code, standard, specification, or project procedures.</p>	<p>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. These shall be placed with other project records as required by codes, standards, specification, or project procedures.</p>	<p>Similar requirement.</p>
9. APPLICABLE CODES, STANDARDS AND GUIDES		
<p>The applicable published codes, standards, and guides shall be used. In cases where codes or standards were intended to cover the manufacturing phase of an item, these codes shall be used as guides. Refer to Appendix B for a listing, not necessarily complete, of additional codes, standards, and guides that should be considered during the construction phase. The following guides or standards refer specifically to nuclear power generating stations and their construction and shall be considered applicable.</p>		<p>The QAPD establishes the quality assurance standards to be applied to the activities.</p>
<p>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</p>		<p>Reg. Guide will be met with NQA-1-1994 in lieu of N45.2 and other criteria as defined in NQA-1-1994.</p>

Installation, Inspection, and Testing of Requirements for Instrumentation and Electric Equipment During the Construction of Nuclear Power Generating Stations N45.2.4-1972/IEEE Std 336-1971	NQA-1 1994 Subpart 2.4 IEEE Standard Installation, Inspection, and Testing Requirements for Power, Instrumentation, and Control Equipment at Nuclear Facilities ANSI/IEEE Std 336-1985	COMMENTS
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 Reg. Guide 1.30 8/72 Position C.2 states: Section 9 of ANSI N45.2.4-1972 lists additional guides and standards made applicable by ANSI N45.2.4. The specific applicability or acceptability of these listed guides and standards has been or will be covered separately in other safety guides or in appropriate Commission regulations.		
Appendixes		
(The 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.)		Not a requirement.
Appendix A		
Supplementary Provisions for Multi-Unit Stations	10. Supplementary Provisions for Multiunit Stations and Operating Plants	
For construction activity in nuclear power generating stations	For construction activity in nuclear facilities where one or more	Similar requirement.

Installation, Inspection, and Testing of Requirements for Instrumentation and Electric Equipment During the Construction of Nuclear Power Generating Stations N45.2.4-1972/IEEE Std 336-1971	NQA-1 1994 Subpart 2.4 IEEE Standard Installation, Inspection, and Testing Requirements for Power, Instrumentation, and Control Equipment at Nuclear Facilities ANSI/IEEE Std 336-1985	COMMENTS
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.	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.	
A1. Planning and Preparation	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.	Instructions, procedures, or drawings shall be prepared to control installation, inspection, and testing activities at areas of interface between the new and existing units.	Similar requirement.
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	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	Similar requirement.
A2. Documentation	10.2 Documentation	
A2.1 The instructions, procedures or drawings described in Section A1 shall be documented and shall be kept current by revisions as necessary.	10.2.1 The instructions, procedures, or drawings described in 10.1 shall be kept current by revisions.	Similar requirement.
A2.2 The equipment and/or systems which are associated with existing unit(s) that are electrically energize 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.	Similar requirement.
A2.3 The documentation associated with installation described in Section 2.2 of the main document shall additionally include:	10.2.3 The documentation associated with installation described in 10.2.2 shall also include:	Similar requirement.
A2.3.1 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.	1) The identification of the equipment or system defined in 10.2.2 which poses a potential hazard in the vicinity of current construction activity	Similar requirement.
A2.3.2 Level of potential hazard from such neighboring	2) Identification of the potential hazard of such neighboring	Similar requirement.

Installation, Inspection, and Testing of Requirements for Instrumentation and Electric Equipment During the Construction of Nuclear Power Generating Stations N45.2.4-1972/IEEE Std 336-1971	NQA-1 1994 Subpart 2.4 IEEE Standard Installation, Inspection, and Testing Requirements for Power, Instrumentation, and Control Equipment at Nuclear Facilities ANSI/IEEE Std 336-1985	COMMENTS
energized systems, such as: voltage, radiation level, fluid pressure and/or temperatures.	energized systems as voltage, radiation level, fluid pressure, or temperatures	
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.	Similar requirement.
	10.2.5 Provisions of Section 9 shall be implemented to supplement or supersede documents or records as required	New requirement regarding records.
A3. Installation	10.3 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).	Similar requirement.
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. This does not prohibit authorized temporary use of such spare capacities.	Similar requirement. Adds allowance for approved temporary use of spare capacities.
A3.3 When working in an area common to the new and the existing units, such as the cable spreading room, control room, radioactive 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.	Similar requirement.
A4. Inspection	10.4 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.	10.4.1 Inspection shall be performed to verify that the requirements of 10.2 and 10.3 have been satisfied.	Similar requirement.
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.	Similar requirement.

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A5. Testing	10.5 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).	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).	Similar requirement.
Appendix B		
Additional Codes, Standards and Guides 1. ANSI C1-1963, 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, 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 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		

Installation, Inspection, and Testing of Requirements for Instrumentation and Electric Equipment During the Construction of Nuclear Power Generating Stations N45.2.4-1972/IEEE Std 336-1971	NQA-1 1994 Subpart 2.4 IEEE Standard Installation, Inspection, and Testing Requirements for Power, Instrumentation, and Control Equipment at Nuclear Facilities ANSI/IEEE Std 336-1985	COMMENTS
<p>13. IEEE Std 62-1958, Guide for Making Dielectric Measurements in the Field</p> <p>14. IEEE Std 64-1969, Guide for Acceptance and Maintenance of Insulating Oil in Equipment</p> <p>15. IEEE Std 81-1962, Guide for Measuring Ground Resistance and Potential Gradients in the Earth</p> <p>16. IEEE Std 95-1962, Guide for Insulation Testing of Large AC Rotating Machinery with High Direct Voltage</p> <p>17. IEEE Std 112A-1964, Test Procedure for Polyphase Induction Motors and Generators</p> <p>18. IEEE Std 114-1969, Test Procedure for Single-Phase Induction Motors</p> <p>19. IEEE Std 115-1965, Test Procedure for Synchronous Machines</p> <p>20. IEEE Std 118-1949, Master Test Code for Resistance Measurement</p> <p>21. IEEE Std 120-1955 (withdrawn), Master Test Code for Electrical Measurement in Power Circuits</p> <p>22. IEEE Std 262-1968, Test Code for Distribution, Power and Regulating Transformers, and Shunt Reactors (ANSI C57.12.90- 1968)</p> <p>23. IEEE Std 283-1968, Guide for Installation of Oil-Immersed Transformers</p> <p>24. ISA-RP3.1, Flowmeter Installations, Seal and Condensate Chambers, 1960</p> <p>25. ISA-S5.1, Instrumentation Symbols and Identification, 1968</p> <p>26. ISA-RP7.1, Pneumatic Control Circuit Pressure Test, 1956</p> <p>27. ISA-RP7.2, Color Code for Panel Tubing, 1957</p> <p>28. ISA-RP8.1, Instrument Enclosures for Industrial Environments</p> <p>29. ISA-RP25.1, Materials for Instruments in Radiation Service, 1957</p> <p>30. ISA-S26, Dynamic Response Testing of Process Control Instrumentation, 1968</p>		

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31. ISA-S37.1, Electrical Transducers Nomenclature and Terminology, 1969 32. ISA-RP42.1, Nomenclature for Instrument Tubing Fittings (Threaded), 1965 33. NEMA ICS-1970, Industrial Controls and Systems 34. NEMA IS 1.1-1969, Enclosures for Industrial Controls and Systems 35. NEMA SG 3-1965, Low-Voltage Power Circuit Breakers 36. NEMA SG 5-1971, Power Switchgear Assemblies 37. NEMA VE 1-1965, Ventilated Cable Trays		

Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants N45.2.5	Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete, Structural Steel, Soils, and Foundations for Nuclear Power Plants NQA-1 1994 SUBPART 2.5	COMMENTS
1. INTRODUCTION	1 GENERAL	
1.1 Scope		
This standard sets forth the supplementary quality assurance requirements of installation, inspection and testing of structural concrete and structural steel for nuclear power plant construction.	Subpart 2.5 provides amplified requirements for installation, inspection, and testing of structural concrete, structural steel, soils, and foundations.	Similar
It is intended for application to those structures from which satisfactory performance is required. <ol style="list-style-type: none"> 1. For the plant to operate reliably 2. To prevent accidents that could cause undue risk to the health and safety of the public 3. To mitigate the consequences of such accidents if they were to occur. 	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.	This is an overall objective of NQA-1, Basic Requirement 2, related to providing control over activities affecting quality consistent with their importance to safety.
Included are the following: <ol style="list-style-type: none"> 1. Formwork 2. Steel Reinforcement 3. Embedded Items 4. Foundation Preparation 5. Concrete 6. Structural Steel 	See Section 2 of NQA-1-1994, Subpart 2.5 below	
The requirements may also be extended to other appropriate parts of nuclear power plants when specified in contract documents.		
This standard is intended to be used in conjunction with ANSI N45.2.		
1.2 Applicability		
The requirement of this standard apply to the work of any organization or individual participating in the production, preparation, placement, inspection and testing of structural concrete and the erection, inspection and testing of structural steel as identified in section 1.1.	See NQA-1, Part II, Introduction for Applicability	

Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants N45.2.5	Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete, Structural Steel, Soils, and Foundations for Nuclear Power Plants NQA-1 1994 SUBPART 2.5	COMMENTS
<p>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.</p>		
<p>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.</p>		
<p>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. This standard applies to structural concrete and structural steel components of nuclear power plants not covered by the Code. For items covered by the Code, it is intended that the requirements of this standard shall supplement the requirements of the Code. In cases where conflict may exist, the requirements of the Code shall govern.</p>		
<p>1.3 Responsibility</p>		
<p>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 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. 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. It is the responsibility of the organization performing these activities to specify the detailed methods and procedures</p>	<p>See NQA-1, Part II, Introduction for Responsibility</p>	<p>Similar requirements between both standards.</p>

Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants N45.2.5	Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete, Structural Steel, Soils, and Foundations for Nuclear Power Plants NQA-1 1994 SUBPART 2.5	COMMENTS
unless they are specified in the procurement documents.		
1.4 Definitions	1.1 Definitions	
The following definitions are provided to assure a uniform understanding of select terms as they are used in this standard. Additional definitions of terms are included in ANSI N45.2.10.	The following definitions are provided to assure a uniform understanding of unique terms as they are used in Subpart 2.5.	Similar. For NQA-1, additional definitions are contained in the Introduction to Part I.
Class of Concrete - Identifies each individual design mix.	Class of concrete - identifies each individual design mix	Similar
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.	Similar
	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	New definition in NQA-1 (Not in N45.2.5 or N45.2.10)
	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 is not more than a distance of 2 mi (3.22 km) and a maximum time of ½ hr in transit from the mixing point, and (b) the delivered concrete commences to be placed within a maximum time of ½ 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.	New definition in NQA-1 (Not in N45.2.5 or N45.2.10) – clarifies “Sampling point” from N45.2.5

Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants N45.2.5	Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete, Structural Steel, Soils, and Foundations for Nuclear Power Plants NQA-1 1994 SUBPART 2.5	COMMENTS
Finishing - The process of obtaining specified surface characteristics of hardened concrete.	Finishing - the process of obtaining specified surface characteristics of hardened concrete	Similar
Qualified Procedures - Procedures which incorporate applicable codes and standards, manufacturer’s parameters and engineering specifications.	NQA-1-1994 defines “Qualified Procedure” as “an approved procedure that has been demonstrated to meet the specified requirements for its intended purpose”	Not in Subpart but in Definition section of NQA-1-1994
Qualification Tests - Tests performed to qualify the basic material source or manufacturer. These tests are mandatory unless current documentary test data are 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	Definition shortened, still same basic intent.
In-Process Tests - Tests performed during the course of construction to maintain control of structural materials. These tests may be performed by the manufacturer or supplier, but samples for these tests must be taken from the lot or batch of materials supplied to the site for use.	Inprocess 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.	NQA-1 Definition expands on who may perform the tests but under same requirements.
Sampling Point - The point at which the concrete leaves the last piece of mixing or agitating equipment prior to being discharged to conveying equipment systems.		Clarified in NQA-1 by use of “Delivery Point” and “Mixing Point”
	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.	New definition in NQA-1 (Not in N45.2.5 or N45.2.10) – clarifies “Sampling point” from N45.2.5
	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.	New definition in NQA-1 (Not in N45.2.5 or N45.2.10) – clarifies “Sampling point” from N45.2.5
1.5 Referenced Documents		
Other documents that are required to be included as a part of this standard are identified at the point of reference and listed in		The QAPD addresses the standards and codes that

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<p>Section 8 and the Appendix of this Standard. The issue or edition of the referenced document that is required is specified in the Appendix.</p> <p>Regarding this subdivision, NRC Regulatory Guide 1.94-4/76 states: "The specific applicability or acceptability of documents listed in Section 8 has been covered separately in other regulatory guides. Other standards and codes listed in ANSI N45.2.5-1974 provide useful guidance for the installation, inspection, and testing of structural concrete and structural steel. Prior to use of these other referenced codes and standards, however, the suitability of the standard or code should be reviewed for the particular application under consideration."</p>		<p>apply to the activities. Use of NQA-1 is not a specific commitment to those referenced standards.</p>
2. GENERAL REQUIREMENTS	2 GENERAL REQUIREMENTS	
	<p>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</p>	<p>Similar to 1.2 of N45.2.5.</p>
<p>N45.2.5 covers this in Section 1.1 as follows: (Included are the following:</p> <ol style="list-style-type: none"> 1. Formwork 2. Steel Reinforcement 3. Embedded Items 4. Foundation Preparation 5. Concrete 6. Structural Steel) 	<ol style="list-style-type: none"> (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 	<p>NQA-1 Subpart 2.5 adds: (g) soils and earthwork (h) special foundations (i) foundation underpinning</p>
2.1 Planning	3 REQUIREMENTS	
<p>Measures shall be established and implemented for documenting installation, inspection, and testing operations to verify conformance to specified requirements.</p>	<p>Measures shall be established and implemented for documenting installation, inspection, and testing activities to verify conformance to specified requirements.</p>	<p>Similar</p>

Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants N45.2.5	Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete, Structural Steel, Soils, and Foundations for Nuclear Power Plants NQA-1 1994 SUBPART 2.5	COMMENTS
	3.1 Planning and Procedures	
<p>Planning shall take into account the need for the preparation and control of procedures and work instructions as necessary to comply with specified requirements for installation, inspection and testing.</p> <p>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 and that they can be accomplished as specified; and that time and resources are sufficient to accomplish the scheduled construction without degradation of quality.</p> <p>Regarding this subdivision, NRC Regulatory Guide 1.94-4/76 states: “The provisions of Subdivision 2.1 ... should be used in conjunction with Regulatory Guide 1.55, ‘Concrete Placement in Category 1 Structures.’” Note that Reg. Guide 1.55 has been withdrawn by the NRC.</p>	<p>Planning and procedure preparation shall be in accordance with the Introduction to this Part (Part II).</p>	<p>The Introduction to NQA-1, Part II addresses these items from N45.2.5 for Planning.</p>
2.2 Procedures and Instructions		
<p>Installation, inspection and test procedures, and work instructions shall be prepared and documented for those activities falling within the scope of this standard.</p>		<p>The Introduction to NQA-1, Part II addresses these items from N45.2.5 for Procedures</p>
<p>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:</p>		<p>Addressed in NQA-1, Part I, Basic Requirement 6.</p>
<ol style="list-style-type: none"> 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. 		<p>Item 4 of N45.2.5 reads “(g) special equipment required” in NQA-1. Item 12 of N45.2.5 reads “(j) acceptance criteria and methods for verifying” in NQA-1.</p>

<p align="center">Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants N45.2.5</p>	<p align="center">Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete, Structural Steel, Soils, and Foundations for Nuclear Power Plants NQA-1 1994 SUBPART 2.5</p>	<p align="center">COMMENTS</p>
<p>7. Frequency of inspections and tests. 8. Prerequisites. 9. Approval. 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.</p>		<p>NQA-1 adds the following: (a) personnel safety (k) responsibility and required qualifications of personnel</p>
<p>2.3 Results</p>		
<p>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 followed in performing the task, and the identification of the following:</p>	<p>Covered in Supplement 10S-1 for Inspection requirements and Supplement 11S-1, Section 4 for documenting test results. These are written as general requirements for all quality activities.</p>	<p>NQA-1 contains equivalent requirements in Part I.</p>
<p>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 anticipated, including nonconformance. 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.</p>		
<p>2.4 Personnel Qualifications</p>		
<p>Personnel performing tests and inspections required by this standard shall be qualified in accordance with ANSI N45.2.6. Personnel performing field inspections and testing activities shall be certified for Level I capability. On-site supervisors of Level I personnel shall be certified for Level II capability and shall be responsible for the proper performance of onsite inspections and tests. Persons charged with engineering managerial responsibility of the inspection and testing organization at the site in either a resident or nonresident capacity shall be certified for Level III capability.</p>	<p>For NQA-1, qualification of inspection and test personnel is not repeated in this subpart. They are contained in Supplement 2S-1, 2; Supplement 10S-1, Section 3.2; and Appendix 2A-1 (although this appendix is nonmandatory, the NRC requires commitment to this for an acceptable program, ref. Reg Guide 1.28).</p>	<p>NQA-1 contains equivalent requirements in Part 1. The QAPD addresses additional qualification requirements.</p>

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Personnel performing nondestructive examinations shall be qualified to appropriate levels of capability as specified in American Society for Nondestructive Testing Recommended Practice SNT-TC-1A.		
2.5 Measuring and Test Equipment.	3.2 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.	Further details for M&TE is contained in Supplement 12S-1 and Subpart 2.16 rather than repeated in this Subpart (2.5).	The overall requirements of NQA-1 are equivalent to those of N45.2.5.
These measuring devices shall include but not to be limited to thermometers, balances, scales, air entrainment meters, humidity meters, volumetric buckets, field soil density measuring devices, pressure gages, and torque wrenches. The following is a clarification made in the current VA QATR: (1) With regard to Section 2.5.1 of ANSI N45.2.5-1974, titled Selection: The Company complies with the requirement set forth in the first paragraph of this Section for selection of measuring and test equipment on the basis of sufficient accuracy to determine conformance to the standard's requirements: This is accomplished without the use of calibrated balances or volumetric buckets. Clarification meets or exceeds applicable guides and standards. The proposed clarification is used to translate construction oriented documents to operational regulations.	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.	Similar The clarification from the current VA QA program will not be carried into the new QAPD. Appropriate calibration of this equipment is currently performed and required by procedure/contract.
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 exists. If no national standards exists, the basis for the adjustment or calibration shall be documented. Records shall be maintained and equipment suitably marked to indicate calibration status. Measures shall be taken to assure proper handling, storage and care of installation of inspection and testing equipment after calibration in order to maintain the required accuracy of such		Addressed in NQA-1, Part 1 and Subpart 2.16.

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equipment.		
Test equipment found to be out of calibration shall be clearly identified as such. 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.		Addressed in NQA-1, Part 1 and Subpart 2.16.
	3.3 Laboratory Testing	
	Laboratory operations and testing associated with concrete and soils shall be controlled using a Quality Assurance Program.	New requirement in NQA-1.
2.6 Housekeeping		
In job-site areas, facilities, and environments where installation, inspection, and testing of structural steel items are performed in accordance with the requirements of this standard, the housekeeping requirements shall be in accordance with ANSI 45.2.3.	Note: See NQA-1, Subpart 2.3 for Housekeeping Standards	Similar requirements. Refer to table comparing the stated standards.
3. PRECONSTRUCTION VERIFICATION	PRECONSTRUCTION VERIFICATION	
3.1 General	4.1 General	
While it is recognized that the requirements for initial receipt inspections and storage are covered by another standard, ANSI N45.2.2, it is necessary to verify that the quality of an item has not suffered during the interim period. It is not intended to duplicate inspections but rather to verify that items are in a satisfactory condition for installation.	Receipt and interim storage inspections shall be used to verify that items are in a satisfactory condition for installation.	Similar requirements. Subpart 2.2 of NQA-1 addresses receipt and storage requirements. N45.2.2 and Subpart 2.2 are compared in a separate table.
The verification shall include: 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.	The verification shall include the following: (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.	Similar requirements.

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3.2 Materials Suitability	4.2 Materials Suitability	
Verification that materials meet specified requirements shall be accomplished through qualification tests and in-process tests.	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.	Similar requirements.
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. A list of minimum required qualification tests or certifications is contained in Table A. This list contains tests necessary to qualify materials for normal application.	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. The specifications shall identify the required qualification tests and the frequency for their repetition. 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 (AC1 Standard 359). Lightweight concrete mix designs shall be made in accordance with AC1 21 1.2. Lightweight concrete aggregates shall be qualified by tests for conformance with ASTM C 330: When splitting tensile strengths are required for lightweight concrete mix, the methods given in ASTM C 330 shall be used.	Similar requirements, NQA-1 does not contain an equivalent to Table A, rather, the subpart refers to other equivalent standards that would control this testing.
Additional tests may be required to qualify materials for special applications.	Additional tests may be required to qualify materials for special application.	Similar requirement.

ANSI N 45.2.5-1974, Table 'A'		
Qualification Tests		
Material	Test For	Test Method
Concrete Aggregates	Compliance with ASTM C33	As referenced in ASTM C33
Cement	Compliance with ASTM C150	As referenced in ASTM C150
Admixtures	Compliance with ASTM C260 or C494 whichever is applicable	Manufacturer's Certification
Fly Ash & Pozzolans	Compliance with ASTM C618	As referenced in ASTM C618

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Water & Ice	Compliance with AASHTO T-26 for effect on: Compressive Strength Setting Time Soundness	ASTM C109 ASTM C191 ASTM C151
Liquid Membrane Forming Curing Compound	Compliance with ASTM C309	As referenced in ASTM C309
Sheet Materials for Concrete Curing	Compliance with ASTM C171	As referenced in ASTM C171
Concrete Mixes	Compliance with ACI 211	As referenced in ACI 211
Reinforcement	*Physical properties of full section test specimen per ASTM A615	*One full section test in accordance with ASTM A370 for each bar size
Structural Steel	Compliance with appropriate specifications such as ASTM A36, A440, etc.	Manufacturer's certification
High Strength Bolts	Compliance with ASTM A325 or A490	Manufacturer's certification *Reduced section test specimen may be used for determination of the percentage of elongation.

3.3 Construction Processes	4.3 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.	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.	Similar requirements.
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	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 in accordance with drawing and specification requirements.	Similar requirements.

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with drawing and specification requirements.		
	5 INSPECTION OF SOILS AND EARTHWORK	NQA-1 adds requirements for Soils and Earthwork that were not included in N45.2.5-1974. Since there is nothing to compare to, the text is omitted.
	6 INSPECTION OF FOUNDATION PILE AND CAISSON CONSTRUCTION	Not addressed in N45.2.5-1974, since there is nothing to compare it to, the text is omitted here.
4.0 INSPECTION OF CONCRETE CONSTRUCTION	7 INSPECTION OF CONCRETE CONSTRUCTION	
4.1 General	7.1 General	
Inspection of concrete construction shall include inspections of preparation for concreting, as well as in-process inspections of concrete measuring, mixing, transporting, placement, curing, and protection to assure conformance to specified requirements. The inspection shall follow the Recommended Practice for Concrete Inspection, ACI 311.	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. The inspection of pretensioning or post-tensioning systems shall be included, if applicable. The inspection shall follow ACI 311.4R, Guide for Concrete Inspection, and PCI MNL-116 and MNL-117.	Similar requirements, updated reference to applicable standards.
4.2 Protection of Materials	7.2 Protection of Materials	
Inspections shall be performed to verify the adequacy and proper maintenance of material storage conditions and handling techniques.	Inspections shall be performed to verify the adequacy and proper maintenance of material storage conditions and handling techniques.	Similar requirements.
These inspections shall include the following:	These inspections shall include the following:	Similar requirements.
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.	(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;	Similar requirements.
2. Inspection of aggregate stockpiles to verify: handling techniques are not resulting in segregation; storage and handling adequately prevent contamination with deleterious substances;	(b) inspection of aggregate stockpiles to verify that: (1) handling techniques are not resulting in segregation; (2) storage and handling adequately prevent contamination	Similar requirements.

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proper temperature and uniform moisture control; and use of frozen materials is prevented.	with deleterious substances; (3) specified temperature and uniform moisture control are maintained; and (4) use of frozen materials is prevented;	
3. Inspection of admixture storage and handling facilities to verify that deterioration and contamination are prevented.	(c) inspection of admixture storage and handling facilities to verify that deterioration and contamination are prevented;	Similar requirements.
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.	(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;	Similar requirements.
	(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.	New requirements for NQA-1.
4.3 Measuring, Mixing, and Transporting Equipment	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 C94, and National Ready Mix Concrete Association - Concrete Plant Standard and Truck Mixer and Agitator Standard.	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.	Similar requirements.
These inspections shall include the following:	These inspections shall include the following:	Similar requirements.
1. Inspection of measuring facilities for the specified accuracy of measuring, weighing, and weight recording devices to control the following:	7.3.1 Inspection of measuring facilities for the specified accuracy of measuring, weighing, and weight recording devices to control the following:	Similar requirements.
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	(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.	Similar requirements, NQA-1 adds requirement concerning lightweight aggregates.

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2. Inspection of central mix plant and truck mixers for wear of drum blades, function 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	Similar requirements.
4.4 Preplacement Preparations	7.4 Preplacement Preparations	
Inspection of preparations for concrete placement shall include the following:	Inspection of preparations for concrete placement shall include the following	Similar requirements.
1. Inspection of compacted structural fill during placement to verify correct material, condition of material, gradation, moisture content, in place density, and compliance with compaction procedures.	(a) inspection of the compacted structural fill or undisturbed soil to verify correct condition;	Similar requirements when considering these two items together. NQA-1 separated the requirements a little different that N45.2.2.
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	(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;	
3. Inspection of previously placed concrete to verify proper preparation for the next lift.	(c) inspection of previously placed concrete to verify proper preparation for the next lift;	Similar requirements.
4. Inspection of formwork, reinforcing and embedded items 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 size, orientation, and installation of reinforcing steel and embedded items; correct location and dimension of control joints, expansion joints, construction joints, blockouts, and waterstops; proper form coating; and cleanness.	(d) inspection of formwork to verify: (1) correct location and configuration, dimensional accuracy, and proper line and grade of formwork; (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 for tightness and placement of grout and vent pipes when preplaced aggregate concrete is used;	Similar requirements.
	(e) inspection of reinforcing steel, prestressing components (if applicable), and other embedded items to verify:	New requirements in NQA-1.

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	(1) correct size, number, location, position, cleanness, and leak tightness, if applicable; (2) proper stringing and absence of physical damage	
5. Inspection of mechanical reinforcing bar splicing operations to verify conformance to the requirements of Section 4.9	(f) inspection of mechanical reinforcing bar splicing operations to verify conformance to the requirements of para. 7.12;	Similar requirements.
	(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;	New requirements in NQA-1.
	(h) inspection of pretensioning load cells and pressure gages for accuracy and calibration, if applicable;	New requirements in NQA-1.
	(i) inspection of pretensioning system strand vises for cleanness, proper lubrication, wear, distortion, and cracking, if applicable;	New requirements in NQA-1.
	(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;	New requirements in NQA-1.
	(l) inspection for embedments.	New requirements in NQA-1.
6. Documentation of inspections (1) through (5) above shall be verified as being complete and indicate that all 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.	Similar requirements, but expanded to cover the additional activities above.
4.5 Concrete Placement	7.5 Concrete Placement	
Inspection of concrete placement shall be performed to verify the following	Inspection of concrete placement shall be performed to verify the following:	Similar requirements.
1. Specified tests of concrete have been performed.	(a) specified tests of concrete have been performed;	Similar requirements.
2. Adherence to specified requirements for: class of concrete,	(b) adherence to specified requirements for class of concrete,	Similar requirements.

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age, rate of placement, lift height, placing sequence, and hot or cold weather concreting practice. (ACI 305-72 or ACI 306-66 respectively)	age, rate of placement, lift height, placing sequence, concrete temperature, and hot or cold weather concreting practice (ACI 305 or ACI 306, respectively);	
3. Proper use of adequate conveying and placing equipment.	(c) proper use of adequate conveying and placing equipment;	Similar requirements.
	(d) harmful materials are not used in covering or placing equipment;	New requirement in NQA-1.
4. Adequate concrete consolidation equipment and technique of operation. Reg. Guide 1.94-4/76, Position C.3 indicated that ACI 309-72 “should be used as a basis for determining the adequacy of the equipment for concrete consolidation and of the technique of operation.”	(e) adequate concrete consolidation equipment and technique of operation (ACI 309);	NQA-1 incorporates the reference to the ACI standard mentioned in the NRC Reg. Guide, but doesn’t limit to a specific year. (Ref. NQA-1, Part II, Introduction, Section 7)
5. Embedded items are not distributed nor forms displaced.	(f) embedded items are not disturbed nor forms displaced.	Similar requirements.
4.6 Finishing and Repair	7.6 Finishing and Repairs	
Inspections shall be performed to verify that specified finishes, i.e., wood float, steel trowel, as cast, or other type, are obtained. 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.	Inspections shall be performed to verify that specified finishes are obtained, i.e., wood float, steel trowel, as cast, or other type. 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.	Similar requirements.
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. Appropriate repairs shall be made.	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. Appropriate repairs shall be made.	Similar requirements.
4.7 Curing	7.7 Curing	
	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.	New requirement in NQA-1. Additional ASTM proposed for use in the QAPD (ASTM C 1315).
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:	Similar requirements.
1. Correct curing method is used, i.e., use of ponding, fog spray,	(a) correct curing method is used, i.e., use of ponding, fog spray,	Similar requirements.

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wet burlap, curing compound, or other method in accordance with specified requirements.	wet burlap, curing compound, or other methods 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.	(b) concrete is kept continuously, i.e., not periodically, wet during the entire curing period, if one of the wet curing methods is used;	Similar requirements.
3. Membrane curing compounds are specifically approved for use prior to application.	(c) membrane curing compounds are specifically approved for use prior to application;	Similar requirements.
4. Curing temperatures is maintained within specified limits during the entire curing period.	(d) curing temperature is maintained within specified limits during the entire curing period;	Similar requirements.
5. Shoring and forms are left in place until concrete has reached the specified strength necessary to preclude the possibility of damage from construction loads.	(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;	Similar requirements, NQA-1 addresses precast members.
	(f) concrete test cylinders are subjected to the same curing process as the concrete when field cured cylinders are required to evaluate curing methods	New requirement in NQA-1
	Subsections 7.8 through 7.10	
	NQA-1 adds new requirements for: Stress Transfer of Pretensioned Members (Subsection 7.8), Post-Tensioning (Subsection 7.9), and Shipping and Handling of Precast Concrete Members (Subsection 7.10)	Requirements of these subsections were not addressed by N45.2.5-1974, since there is nothing to compare them to, they are omitted from this table.
4.8 In-Process Tests on Concrete and Reinforcing Steel	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 concrete. A list of the required in-process tests is contained in Table B. The test frequencies given shall be considered minimums. 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 indicate that the frequency should be increased. Samples for in-process tests of concrete shall be taken at the	In-process tests shall be performed during the course of construction to maintain control of structural, prestressed, and precast concrete. 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	Requirements are similar, but NQA-1 includes the additional items from the above new sections and refers to an equivalent ACI standard rather than including a table like N45.2.5.

<p align="center">Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants N45.2.5</p>	<p align="center">Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete, Structural Steel, Soils, and Foundations for Nuclear Power Plants NQA-1 1994 SUBPART 2.5</p>	<p align="center">COMMENTS</p>
<p>sampling point in accordance with ASTM C172. This point may be at the truck mixer discharge if the last piece of conveying equipment is a chute, bucket, conveyor system, or similar equipment. Pumped concrete must be sampled from the pump line discharge. No water or other ingredients may be added to any concrete batch at the sampling point for inprocess tests. Samples shall not be taken from concrete after it has been deposited in the form.</p>	<p>tests shall be considered minimum, unless current documentary test data are available to establish adequate confidence in conformance of materials to specified requirements.</p> <p>(a) for concrete materials - unit weight/yield</p> <p>(b) for aggregate materials</p> <ol style="list-style-type: none"> (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 	
<p>From N45.2.5-1978, Section 6.11 – Millstone only commitment.</p> <p>6.11 In-Process Tests on Concrete and Reinforcing and Prestressing Steels</p> <p>In-process tests shall be performed during the course of construction to maintain control of structural, prestressed and precast concrete. A list of the required in-process tests is contained in Table B. The test frequencies given shall be considered minimums. 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.</p> <p>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. No water or other ingredients may be added to any batch after making the in-process tests. Samples shall not be taken from concrete deposited in the form. Except as noted below for pumped concrete and when correlation testing is</p>	<p>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.</p> <p>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.</p> <p>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. No water or other ingredients may be added to any concrete batch after making the in-process tests. Samples shall not be taken from concrete deposited in the form. 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.</p> <p>When concrete is pumped during its movement from the delivery point to the placement point, in-process strength samples shall be</p>	<p>New requirement in NQA-1 for the Virginia sites. Millstone had a commitment for this section to a more recent edition of N45.2.2. The requirements between that edition and NQA-1 are similar.</p>

<p align="center">Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants</p> <p align="center">N45.2.5</p>	<p align="center">Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete, Structural Steel, Soils, and Foundations for Nuclear Power Plants</p> <p align="center">NQA-1 1994 SUBPART 2.5</p>	<p align="center">COMMENTS</p>
<p>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.</p> <p>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.</p> <p>Where correlation testing is in effect, in-process strength samples may be taken at the delivery point.</p> <p>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 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, whichever provides the greater number of samples.</p> <p>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. The frequency of correlation tests shall be at an interval four times greater than that noted in Table B for in-process tests. 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.</p>	<p>taken at the placement point, unless correlation tests of air content, slump, and temperature are performed. When correlation testing is in effect, in-process strength samples may be taken at the delivery point.</p> <p>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 this case, the frequency of the correlation of strength samples taken at the delivery point shall be taken each 500 CU yd (382 m3) of concrete or twice each week, whichever provides the greater number of samples.</p> <p>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. The frequency of the correlation tests shall be at an interval of four times greater than the required test frequency. 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 m3) of concrete places as long as limits and tolerances are exceeded. If no limits and tolerances are specified, ASTM C 94 shall apply</p>	
<p>Table B, "Required In-Process Tests," is reproduced below this section for readability.</p>		

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ANSI N45.2.5-1974 Table B Required In-Process Tests			
Material	Requirement	Test Method	Test Frequency
Concrete	Mixer uniformity	ASTM C94	Initially and every 6 months thereafter
	Sampling method	ASTM C172	
	Compression cylinders	ASTM C31	
	Compressive strength	ASTM C39	2 cylinders for 28-day test from each 100 cu yd or a minimum of 1set/day for each class of concrete
	Slump	ASTM C143	First batch produced each day and every 50 cu yd placed
	Air content	ASTM C173 or C231	First batch produced each day and every 50 cu yd placed
	Temperature		First batch produced each day and every 50 cu yd placed
Grout	Unit weight/yield	ASTM C138	Daily during production
	Compressive strength	ASTM C109	Daily during production

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Aggregate	Compliance with requirements for:		
	Gradation	ASTM C136	Daily during production
	Moisture content	ASTM C566	Daily during production
	Material finer than No. 200 sieve	ASTM C117	Daily during production
	Organic impurities	ASTM C40	Weekly during production*
	Friable Particles	ASTM C142	Monthly during production*
	Lightweight pieces	ASTM C123	Monthly during production*
	Soft fragments	ASTM C235	Monthly during production*
	Los Angeles abrasion	ASTM C131 or C535	Every 6 months*
	Flat and elongated particles	CRD C119	Every 6 months*
	Potential reactivity	ASTM C289	Every 6 months*
	Soundness	ASTM C88	Every 6 months*
Water & Ice	Compliance with AASHTO T26 for effect on:		
	Compressive strength	ASTM C109	Every 6 months
	Setting time	ASTM C191	Every 6 months
	Soundness	ASTM C151	Every 6 months
Admixtures	Chemical Composition	Infrared spectrophotometry analysis	Composite of each shipment
Fly Ash & Pozzolans	Chemical & physical properties per ASTM C618	ASTM C311	Each 200 tons
Cement	Standard physical and chemical properties	ASTM C150	Each 1200 tons ASTM C183
Reinforcing Steel	**Physical properties of full section test specimen per ASTM A615	ASTM A370	**One full section test for each bar size for each 50 tons or fraction thereof from each heat
Cadweld Reinforcing Bar Splices	Section 4.9.3	Section 4.9.3	Section 4.9.4

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* These test frequencies shall be considered minimum unless current documentary test data are available to establish complete confidence in conformance to specification requirements.

**Reduced section test specimen may be used for determination of the percentage of elongation

ANSI N45.2.5-1978 (MPS Commitment)

Table B Required In-Process Tests

Material	Requirement	Test Method	Test Frequency
Concrete	Mixer uniformity	ASTM C-94	Initially and every 6 months thereafter
	Sampling method	ASTM C-172	
	Compression cylinders	ASTM C-31	
	Compression cylinders—pre-placed aggregate concrete	CRD-C-84	
	Compressive strength	ASTM C-39	2 cylinders for 28-day test from each 100 cu yd or a minimum of 1 set/day for each class of concrete
	Slump	ASTM C-143	First batch produced each day and every 50 cu yd placed
	Air content	ASTM C-173 or C-231	With each set of compression cylinders
	Temperature		First batch produced each day and every 50 cu yd placed
	Unit weight/yield	ASTM C-138	Daily during production*
Grout	Compressive strength	ASTM C-109 (for expansive grout use CRD-C 589)	Daily during production
Grout for Preplaced Aggregate Concrete	Time of set	CRD-C 82	Daily during production
	Flow	CRD-C 79	Daily during production
	Expansion and Bleeding	CRD-C 81	Daily during production

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Aggregate	Compliance with requirements for:		
	Gradation	ASTM C-136	Daily during production
	Moisture content	ASTM C-566	Twice daily during production
	Material finer than No. 200 sieve	ASTM C-117	Daily during production
	Unit weight of aggregate	ASTM C-29	Daily during production*
	Fixed water and iron content of aggregates only for radiation-shielding concrete	ASTM C-637	Daily during production*
	Organic impurities	ASTM C-40	Weekly during production*
	Flat and elongated particles	CRD-C-119	Monthly during production*
	Lightweight particles	ASTM C-123	Monthly during production*
	Soft fragments	ASTM C-235	Monthly during production*
	Specific gravity & Absorption	ASTM C-127 or ASTM C-128	Monthly during production*
	Los Angeles abrasion	ASTM C-131 or C-535	Every 6 months*
	Potential reactivity	ASTM C-289	Every 6 months*
	Soundness	ASTM C-88	Every 6 months*
Water & Ice	Compliance with project specifications for effect on:		
	Compressive strength	ASTM C-109	Monthly
	Setting time	ASTM C-191	Monthly
	Chlorides	ASTM D-512	Monthly
	Total solids	ASTM D-1888	Monthly
Admixtures	Chemical Composition, Ph, and specific gravity	ASTM C-494	Composite of each shipment
Fly Ash & Pozzolans	Chemical & physical properties per ASTM C618	ASTM C-311	As specified in ASTM C-311

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Cement	Standard physical and chemical properties	ASTM C-150		As specified in ASTM C-183
Reinforcing Steel	**Physical properties of full section test specimen per ASTM A-615	ASTM A-370		One full section test for each bar size for each 50 tons or fraction thereof from each heat
Cadweld Reinforcing Bar Splices	Section 6.12	Section 6.12.3		Section 6.12.4
Soil	Compaction Test	ASTM 698 or 1557, Method A, B, C, or D, as specified.		One for each 10,000 cu yd with at least one for each soil type, and when soil type is questionable
	Grain Size	ASTM D-422 hydrometer or sieve as appropriate		One for each compaction test
	Plasticity Index	ASTM D-424		One for each compaction test and when volume change characteristics are questionable
	Borrow Moisture	ASTM D-1556, 2167, 3017, or 2937, as specified		One for each soil type, one before each work shift, and when moisture content changes or is questionable
	Fluid Density Test	ASTM D-1556, 2167, 2922, or 2937 as specified		Test as specified in owner's specs and when compaction of soil type is questionable. Minimum every 10,000 sq ft
	Fines Content	ASTM D-1140		Every 100,000 sq ft
		Note 1. See definition of In-Process tests. * These test frequencies shall be considered minimum unless current documentary test data are available to establish complete confidence in conformance to specification requirements. **Reduced section test specimen may be used for determination of the percentage of elongation.		
4.9 Mechanical (Cadweld) Splice Testing		7.12 Mechanical (Sleeve With Ferrous Filler Metal) Splice Testing		
		The mechanical (sleeve with ferrous filler metal) splice testing		NQA-1 refers to equivalent

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	shall be done in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (ACI Standard 359).	ACI standard rather than stating all the requirements in the subpart.
4.9.1 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 for each of the splice positions (e.g., horizontal, vertical, diagonal) to be used. The qualification splices shall be made using the same materials (e.g., bar, sleeve, powder) as those to be used in the structure. To qualify, the completed splices must meet the specified visual inspection acceptance requirements and meet the tensile test requirements of Section 4.9.3.		
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 is another reason to question their ability, such as the completed splices not passing visual inspection or tensile testing. The requalification procedure should be identical to the original qualification procedure.		
VA QATR exception for restoring containment during reactor vessel head replacement project. Modified commitment to ASME Code, 1995 edition, subparagraph 4333.4, states: CC- 4333.4 Initial Qualification Tests. [A95] Each splicer shall prepare two qualification splices on the largest bar size to be used. In addition, for ferrous filler metal splices, cementitious grouted splices, and swaged splices only, each of the splice positions to be used (e. g., horizontal, vertical, diagonal) shall be qualified. The qualification splices shall be made using reinforcing bar identical to that to be used in the structure. The completed		This alternative was for a specific application during the Reactor Vessel Head Replacement Projects and will not be carried forward in the new QA program since that activity is completed.

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<p>qualifications splices shall be tensile tested using the loading rates set forth in SA-370 and the tensile results shall meet those specified in Tables CC-4334-1. [A95]</p>		
<p>4.9.2 Visual Inspection.</p>		
<p>All completed mechanical splices shall be 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, permissible gap between rebar ends, allowable voids in filler metal, extent of leaking of filler metal, gas blowout, amount of packing and slag at the tap hole. All visual inspections on completed splices shall be performed only after the splices have cooled to ambient temperatures. Splices that fail to pass visual inspection shall be discarded and replaced and shall not be used as tensile test samples.</p>		
<p>4.9.3 Tensile Testing</p>		
<p>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). 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 4.9.4 to determine conformance with the following acceptance standards:</p>		
<p>1. The tensile strength of each sample tested shall equal or exceed 125 percent of the minimum yield strength specified in ASTM A615 using loading rates set forth in ASTM A370.</p>		
<p>2. The average tensile strength of each group of 15 consecutive samples shall equal or exceed the ultimate tensile strength specified for the reinforcing bar.</p>		
<p>Since curved reinforcing bars will not tensile test accurately, production splice samples should not be removed from curved</p>		

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reinforcing bars for tensile testing. Straight sister splice samples should be made for each of the required curved reinforcing bar production splices. Production samples should 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). Representative sister splice samples shall be used in such cases. The sampling frequency specified in Section 4.9.4(2) should then be followed, except that all splices tested shall be sister splices.		
VA QATR exception for restoring containment during reactor vessel head replacement project. Modified commitment to ASME Code, 1995 edition, subparagraph 4333.5.2, states: CC- 4333.5.2 Splice Samples. Splice samples may be production splices (cut directly from in- place reinforcement) or straight sister splices (removable splices made in place next to production splices and under the same conditions), in accordance with the schedule established in CC- 4333.5.3.		This alternative was for a specific application during the Reactor Vessel Head Replacement Projects and will not be carried forward in the new QA program since that activity is completed.
4.9.4 Tensile Test Frequency.		
Separate test cycles shall be established for mechanical splices in horizontal, vertical, and diagonal bars, for each bar size, and for each splicing crew as follows:		
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		
2. Test Frequency for Combination of Production and Sister Splices.		
If production and sister splices are tested, the sample frequency		

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shall be:		
a. One production splice of the first 10 production splices		
b. One production and three sister splices for the next 90 production splices		
c. Three splices, either production or sister splices for the next and subsequent units of 100 splices. At least 1/4 of the total number of splices tested shall be production splices.		
<p>VA QATR exception for restoring containment during reactor vessel head replacement project. Modified commitment to ASME Code, 1995 edition, subparagraph 4333.5.3, states: CC- 4333.5.3 Testing Frequency. [A95] Splice samples shall be tensile tested in accordance with the following schedule for the appropriate splice system. (a) Separate test cycle shall be established for sleeve with ferrous filler metal splices, sleeve with cementitious grout splices, and swaged splices in the horizontal, vertical, and diagonal bars. Straight sister splices may be substituted for production test samples on radius bent bars and for splicing sleeves arc welded to structural steel elements or the liner. 1) For sleeve with ferrous filler metal splices, one splice shall be tested for each unit of 100 production splices. Modified commitment to ASME Code, 1995 edition, subparagraph 4333.5.2, requires testing of either production or sister splices, as stated in paragraph (4b).</p>		<p>This alternative was for a specific application during the Reactor Vessel Head Replacement Projects and will not be carried forward in the new QA program since that activity is completed.</p>
4.10 Welded Reinforcing Bar Splices	7.13 Welded Reinforcing Bar Splices	
<p>Welded reinforcing bar splices shall be subject to the requirements of Section 5.5, except that provisions of AWS D12.1 shall apply. Reg. Guide 1.94-4/76, Position C.4 states: "In addition, the provisions of Articles CC4334 and CC4330 of the 'Code for Concrete Reactor Vessels and Containments' (ASME Boiler and</p>	<p>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 (AC1 Standard 359) shall also apply.</p>	<p>NQA-1 addresses the code the NRC Reg. Guide makes reference to.</p>

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Pressure Vessel Code, Section III, Division 2, 1975 Edition) for testing of welded reinforcing bar splices should be used as guidance pending endorsement of that code by the NRC staff.”		
5. INSPECTION OF STEEL CONSTRUCTION	8 INSPECTION OF STEEL CONSTRUCTION	
5.1 General	8.1 General	
<p>Inspection of steel construction in accordance with 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.</p> <p>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.</p>	<p>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. 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.</p> <p>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.</p>	<p>Similar requirements, but NQA-1 give examples of specifications to be used.</p>
5.2 Supporting Structures	8.2 Supporting Structures	
<p>Prior to erection of steel, anchor bolts and 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.</p> <p>Grouting of base plates, beam pockets, etc., shall be controlled to assure that only specified materials are used, proportioned properly, placed correctly, and cured properly to achieve the specified compressive strength</p>	<p>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. 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</p>	<p>Similar requirements.</p>
5.3 Assembly and Erection	8.3 Assembly and Erection	
<p>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</p>	<p>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</p>	<p>Similar requirements.</p>

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<p>often as is necessary as erection progresses to insure that specified requirements are met. Particular attention shall be given to verification of the condition of contact surfaces of friction type connections and bolt hole alignment. Correction of fabrication errors shall be closely controlled to prevent correction of misaligned holes by reaming in excess of AISC tolerances. Burning of bolt holes is not permitted. All equipment used in connecting operations shall be inspected to verify conformance with specification requirements. For example, air compressors must be of sufficient capacity to maintain the required operating pressure for impact tools.</p>	<p>often as is necessary as erection progresses to ensure that specified requirements are met. Particular attention shall be given to verification of the condition of contact surfaces of friction type connections and bolt hole alignment. Correction of fabrication errors shall be closely controlled to prevent correction of misaligned holes by reaming in excess of AISC tolerances. Burning of bolt holes is not permitted. Equipment used in connecting operations shall be inspected to verify conformance with specification requirements. For example, air compressors shall be of sufficient capacity to maintain the required operating pressures for impact tools.</p>	
5.4 High Strength Bolting	8.4 High Strength Bolting	
<p>Bolt tightening shall be in accordance with the specified method, i.e., automatic cut-off impact wrench or turn-of-nut method. 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. If an automatic cut-off impact wrench is used, it shall be calibrated at least twice daily. 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. Installation of bolts shall be done in accordance with “Specifications for Structural Joints Using ASTM A325 or A490 Bolts.”</p>	<p>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. If an automatic cutoff impact wrench is used, it shall be calibrated at least twice daily. 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. Installation of bolts shall be done in accordance with AISC 5329, Specifications for Structural Joints Using ASTM A 325 or A 490 Bolts. Qualification of bolts shall be documented by manufacturer’s certification or as otherwise specified.</p>	<p>Similar requirements. NQA-1 adds allowance for direct-tension indicator and requires manufacturer certification of bolt qualification or other specified assurance of qualification.</p>
	8.4.1 Inspection of Bolting.	
<p>Inspection of bolting shall include visual inspections of bolting operations and torque wrench inspection of completed connections. All connection points shall be visually inspected for the following items: 1. Bolts are the correct length as indicated by at least two threads</p>	<p>Inspection of bolting shall include visual inspection of bolting operations and torque wrench inspection of completed connections. Connection points shall be visually inspected for the following items: (a) bolts are long enough as indicated by the point of the bolts</p>	<p>Similar requirements, but NQA-1 revised minimum bolt length requirement.</p>

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<p>extending beyond the nut.</p> <p>2. Correct type bolt is used as indicated by the manufacturer’s marking on the head.</p> <p>3. Torque has been applied as indicated by the burnishing or peening of the corners of the nut.</p> <p>4. Turning elements are on the correct face; washers are used when required.</p> <p>... The schedule of bolt tension inspection shall be as specified in the latest edition of “Specification for Structural Joints Using ASTM A325 or A490 Bolts.” In addition, at the beginning of tightening operations, all bolts tightened by each bolting crew shall be checked until the results are consistently acceptable.</p>	<p>being flush with or outside the face of the nuts;</p> <p>(b) correct type bolt is used as indicated by the manufacturer’s marking on the head;</p> <p>(c) torque has been applied as indicated by the burnishing or peening of the corners of the nut;</p> <p>(d) turning elements are on the correct face; properly sized washers are used when required.</p> <p>Bolt tension inspection shall be as specified in AISC S329, Specification for Structural Joints Using ASTM A 325 or A 490 Bolts. 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.</p>	
	8.4.2 Inspection Tools and Procedure.	
<p>Hand torque wrenches used for inspection shall be controlled in accordance with Section 2.5.2 and must be calibrated at least weekly and more often if deemed necessary. Impact torque wrenches used for inspection must be calibrated at least twice daily. ...</p>	<p>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. Impact torque wrenches used for inspection shall be calibrated at least twice daily. Feeler gauges used for inspection of direct-tension indicators shall be controlled.</p>	<p>Similar requirements, NQA-1 adds requirement to control feeler gauges used for inspections.</p>
5.5 Welding	8.5 Welding	
<p>Inspection of structural steel welding shall be performed in accordance with the provisions of AWS D1.1, Section 6, entitled “Structural Welding Code” and supplemental addenda. This inspection shall include visual examination of preparations, welding processes, and post-welding operations. Prior to welding, verification of welding procedure and welder qualification shall be documented and shall include all essential variables identified in the procedure.</p>	<p>Inspection of structural steel welding shall be performed in accordance with the provisions of Section 6.0 of AWS D1.1, Structural Welding Code - Steel. 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. Prior to welding, verification of welding procedure and welder qualification shall be documented and shall include all essential variables identified in the procedures.</p>	<p>Similar requirements, NQA-1 adds requirement for NDE when deemed necessary.</p>
<p>In-process inspections shall include 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. Procedures shall be established to control</p>	<p>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.</p>	<p>Similar requirements, NQA-1 added inspection point for environmental conditions.</p>

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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.	
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 which disclosed the repairable defect. All weld repairs necessitated by nondestructive examinations shall be documented.	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. All weld repairs necessitated by nondestructive examination shall be documented.	Similar requirements.
6. DATA ANALYSIS AND EVALUATION	9 DATA ANALYSIS AND EVALUATION	
6.1 General	9.1 General	
Procedures shall be established for processing inspection and test data and their analysis and evaluation. These procedures shall provide for acquisition and preparation of inspection and test data for prompt evaluation against acceptance criteria, operating limits, and performance standards.	Procedures shall be established for processing inspection and test data and their analysis and evaluation. These procedures shall provide for acquisitions and preparation of inspection and test data for prompt evaluation against acceptance criteria, operating limits, and performance standards.	Similar requirements.
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 shall be analyzed and evaluated to verify the 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. Inspection and test results that include inspection and test data, together with a report of data analysis and evaluation, shall be prepared as specified in Section 7.	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 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. 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.	Similar requirements.
6.2 Concrete and Mechanical (Cadmold) Splice Test Data Evaluation and Analysis	9.2 Concrete and Mechanical (Sleeve With Ferrous Filler Metal) Splice Test Data Evaluation and Analysis	
6.2.1 Evaluation of Concrete Test Results.	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. Concrete quality and acceptance criteria shall conform to the requirements of ACI 318, Chapter 4.	Standard deviation data shall be developed, evaluated, and maintained for permanent records in accordance with ACI 214. Concrete quality and acceptance criteria shall conform to the requirements of ACI 318, Chapter 4.	Similar requirements.

<p align="center">Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants N45.2.5</p>	<p align="center">Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete, Structural Steel, Soils, and Foundations for Nuclear Power Plants NQA-1 1994 SUBPART 2.5</p>	<p align="center">COMMENTS</p>
<p>6.2.2 Evaluation of Mechanical (Cadmold) Splice Test Results.</p>	<p>9.2.2 Evaluation of Mechanical Splice Test Results.</p>	
<p>The following procedure shall be used for substandard tensile test results.</p>	<p>The evaluation of mechanical splice test results shall be in accordance with ASME Boiler and Pressure Vessel Code, Section III, Division 2 (AC1 Standard 359).</p>	<p>NQA-1 refers to an equivalent ACI standard rather than containing the information in the subpart.</p>
<p>1. If any production of sister splice tested fails to meet the tensile test specification of Section 4.9.3(1) 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. If any production or sister splice used for testing fails to meet the tensile test specification in Section 4.9.3(1) and the observed rate of splices that fail the tensile test exceeds one for each 15 consecutive test samples, mechanical splicing shall be stopped. 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 independent laboratory analysis shall be made to identify the cause of all failures. The results of these tests shall be evaluated by the responsible engineering organization to determine the required corrective action. The responsible engineering organization shall specify the extent of repairs necessary and the actions required to prevent further failures from the identified causes. If two or more splices from any of these six additional splice samples fail to meet the tensile test specification of Section 4.9.3(1), the balance of the 100 production splices under investigation shall be rejected and replaced. When mechanical splicing is resumed, the sampling procedure shall be started anew.</p>		
<p>2. If the average tensile strength of the 15 consecutive samples fails to meet the provisions of Section 4.9.3(2), 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</p>		

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<p>were taken.</p>		
	<p>9.2.3 Evaluations 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. 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</p>	<p>New requirement in NQA-1.</p>
<p>6.3 Steel Construction Test Data Evaluation and Analysis These data shall be evaluated for conformance to project specifications, the AISC Manual of Steel Construction and AWS D1.1 and supplemental addenda.</p>	<p>9.3 Steel Construction Test Data Evaluation and Analysis This data shall be evaluated for conformance to project specifications of the AISC M011, Manual of Steel Construction and AWS D1.1, Structural Welding Code - Steel.</p>	<p>Similar requirements.</p>
	<p>9.4 Soils Test Data Evaluation and Analysis This data shall be evaluated daily during progress of the work for conformance to project specifications. The control techniques given in the specifications, such as specific test methods for the type of soil compacted, shall be verified. 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. Data shall include verification that the soils are fully compacted or consolidated to contours and the grades specified. When statistical methods are required by the specification, the desired level of confidence shall be specified.</p>	<p>New requirement in NQA-1</p>
<p>7. RECORDS</p>	<p>10 RECORDS</p>	
<p>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. These shall be placed with other project records as required by code, standard, specification, or</p>	<p>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. These shall be retained with other project records as required by code, standard, specification, or project procedures.</p>	<p>Similar requirements.</p>

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project procedures.		
Collection, storage and maintenance of records shall be in accordance with ANSI N45.2.9.		N45.2.9 is similar to NQA-1, Supplement 17S-1 (mandatory) and Appendix 17A-1 (non-mandatory), additional requirements are addressed in the QAPD.
8. REVISIONS OF AMERICAN NATIONAL STANDARD 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 N45.2.2 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 Quality Assurance Records for Nuclear Power Plants N45.2.10 Quality Assurance Terms and Definitions		The QAPD addresses commitment to specific editions of standards.

Supplementary Quality Assurance Requirements For Installation, Inspection And Testing Of Mechanical Equipment And Systems For The Construction Phase Of Nuclear Power Plants ANSI N45.2.8 - 1975	Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems for Nuclear Power Plants NQA-1 1994 Subpart 2.8	COMMENTS
1.1 Scope	1 GENERAL	
<p>This standard contains requirements and guidelines to assure the quality of important items of nuclear power plants including structures, systems and components. 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. 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. 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. This standard is intended to be used in conjunction with ANSI N45.2. If any conflict exists, ANSI N45.2 shall govern.</p> <p>The following is a clarification made in the current VA QATR: The Operational Quality Assurance Program complies with this guide with the following clarification: See Generic Statement which prefaces this table. Clarification meets or exceeds applicable guides and standards. The proposed clarification is proposed as a construction to operations device.</p> <p>Generic Statement from the current VA QATR: For operations phase maintenance and modification activities which are comparable in nature and extent to similar activities conducted during the construction phase, the Company shall control these activities under this</p>	<p>Subpart 2.8 provides amplified requirements for installation, inspection, and testing of mechanical equipment and systems. 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.</p>	<p>Clarification not required under NQA-1, since it applies to construction and operations phase activities..</p>

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<p>Operational Quality Assurance Program. Designated modifications may be controlled under a contractor's Quality Assurance Program which has been approved by the Company's Quality Assurance Program. When this Operational Quality Assurance Program or an approved contractor's Quality Assurance Program is used, the Company shall comply with the Regulatory Position established in the guides listed herein in that quality assurance programmatic/administrative requirements included therein (subject to the clarification in this table) shall apply to these maintenance and modification activities even though such requirements may not have been in effect originally. Maintenance or modifications which may affect the function of safety related structures, systems, or components shall be performed in a manner at least equivalent to that specified in original design bases and requirements, materials specifications, and inspection requirements. A suitable level of confidence in structures, systems, or components on which maintenance or modifications have been performed shall be attained by appropriate inspection and performance testing.</p>		
<p>1.2 Applicability</p>		
<p>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. The extent to which the individual requirements of a standard apply will depend upon the nature and scope of the work to be performed and the importance of the item or service involved. Important mechanical items to be covered and the extent of coverage shall be identified by the individual or organization invoking this standard. The requirements</p>	<p>Applicability is discussed in NQA-1-1994, Part II, Introduction.</p>	<p>The NQA-1, Part II, Introduction section on applicability does not contain as much detail as N45.2.8, but it does address the substance of N45.2.8 regarding assuring use of proper materials, equipment, processes, and procedures.</p>

Supplementary Quality Assurance Requirements For Installation, Inspection And Testing Of Mechanical Equipment And Systems For The Construction Phase Of Nuclear Power Plants ANSI N45.2.8 - 1975	Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems for Nuclear Power Plants NQA-1 1994 Subpart 2.8	COMMENTS
<p>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. 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 1 and 2 and Section XI of the Code for those activities covered by the Code.</p> <p>Reg. Guide 1.30 8/72 Position C.2 states: Although ANSI N45.2.8-1975 is entitled "Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems for the Construction Phase of Nuclear Power Plants," the requirements included in the standard are considered to be applicable during the operations phase as well as the construction phase and should be followed for those applicable operations phase activities that are comparable to activities occurring during the construction phase. In this regard, it should be noted that N45.2.8-1975 does not address radiological considerations associated with installation, inspection, and testing of mechanical components in radioactively contaminated systems.</p>		
<p>1.3 Responsibility</p>		
<p>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 work of establishing practices and procedures and providing the</p>	<p>Responsibility is discussed in NQA-1-1994, Part II, Introduction, and programmatically in NQA-1, Part I, Basic Requirement 1 with Supplement 1S-1.</p>	<p>The combination of the requirements from NQA-1 are equivalent to the requirements stated by N45.2.8.</p>

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<p>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. 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. 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.</p>		
1.4 Definitions	1.1 Definitions	
<p>The following definitions are provided to assure a uniform understanding of select terms as they are used in this standard.</p>	<p>The following definitions are provided to assure a uniform understanding of unique terms as they are used in Subpart 2.8.</p>	<p>NQA-1 defines the common terms used throughout the standard in Part I, Introduction § 4.</p>
<p>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.</p>	<p>(From Part I) acceptance criteria - specified limits placed on characteristics of an item, process, or service defined in codes, standards, or other requirement documents.</p>	<p>Similar definition, but doesn't list the examples.</p>
<p>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.</p>	<p>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</p>	<p>Similar definition.</p>
<p>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.</p>	<p>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</p>	<p>Similar definition.</p>
<p>Examination - An element of inspection consisting of investigation of materials, components, supplies and</p>	<p>Examination - an element of inspection consisting of investigation of materials, components, supplies, and</p>	<p>Similar definition.</p>

Supplementary Quality Assurance Requirements For Installation, Inspection And Testing Of Mechanical Equipment And Systems For The Construction Phase Of Nuclear Power Plants ANSI N45.2.8 - 1975	Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems for Nuclear Power Plants NQA-1 1994 Subpart 2.8	COMMENTS
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.	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.	
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.	(From Part I) inspection - examination or measurement to verify whether an item or activity conforms to specified requirements.	Similar definition.
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.	Similar definition.
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.	(From Part I) 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	Similar definition.
Verification - An act of confirming, substantiating and assuring that an activity or condition has been implemented in conformance with the specified requirements.	(From Part I) verification – the act of reviewing, inspecting, testing, checking, auditing, or otherwise determining and documenting whether items, processes, services, or documents conform to specified requirements.	NQA-1 definition encompasses the N45.2.8 definition in substance, but not using the same terminology.
Other terms and their definitions are contained in ANSI N45.2.10.		Other terms for NQA-1 are defined in Part I, Introduction § 4.
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. The issue or edition of the referenced document that is required will be		Similar statement exists in NQA-1, Part II, Introduction, § 7. The QAPD will address that these are references for guidance unless otherwise stated in the

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<p>specified either at the point of reference or in Section 8 of this standard unless otherwise specified in the contract document.</p> <p>Reg. Guide 1.30 8/72 Position C.1 states: Subdivision 1.5 of ANSI N45.2.8-1975 states: "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." The specific acceptability of these listed documents has been or will be covered separately in other regulatory guides or in Commission regulations where appropriate.</p>		<p>QAPD. Implementing documents, procedures, specifications, contracts, etc will have to ensure appropriate standards are referenced for the activity in accordance with NRC or other regulatory requirements.</p>
<p>2. GENERAL REQUIREMENTS</p>	<p>2 GENERAL REQUIREMENTS</p>	
<p>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. Measures shall be established and implemented for documenting the necessary installation, inspection and testing to verify conformance to specified requirements</p>	<p>Measures shall be established and implemented for documenting the necessary installation, inspection, and testing to verify conformance to specified requirements.</p>	<p>Similar requirement.</p>
<p>2.1 Planning</p>	<p>2.1 Planning and Procedures</p>	
<p>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,</p>	<p>Planning and procedure preparation shall be in accordance with the requirements of the Introduction to this Part (Part II).</p>	<p>NQA-1, Part II, Introduction, § 4.1 addresses Planning and contains similar requirements to N45.2.8.</p>

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<p>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. Deficiencies identified during reviews shall be brought to the attention of the responsible organization for action.</p>		
<p>2.2 Procedures and Instructions</p>		
<p>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. 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. 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:</p> <ul style="list-style-type: none"> a. Prerequisites identified in Subsection 2.9. b. Precautions to be observed. c. Installation requirements. d. Sequential actions to be followed. e. Test objectives. f. Special equipment required for installation, inspection and test. g. Identification of inspection and test equipment. h. Frequency of inspection or test. i. Inspection and test acceptance criteria. j. Specific document references where required. 		<p>NQA-1, Part II, Introduction, § 4.2 addresses Procedures and contains similar requirements to N45.2.8. The specific list of items in N45.2.8 are all encompassed by the list in NQA-1.</p>

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k. Data report forms. l. Approvals		
2.3 Results		
<p>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 instruction followed in performing the task and include the following:</p> <ul style="list-style-type: none"> a. Pertinent inspection and test data. b. Significant dates and times. c. Signature or stamp of inspector or tester. d. Measuring and test equipment used where required. e. Identification of nonconformances and action taken on other conditions that were not anticipated. <p>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 evaluation.</p>		<p>NQA-1 addresses these requirements under the programmatic controls of Basic Requirements 10 and 11, and Supplements 10S-1 and 11S-1.</p>
2.4 Cleaning		
<p>Cleaning activities required by this standard shall be performed in accordance with ANSI N45.2.1 and Section 4 of this standard.</p>		<p>NQA-1, Part II addresses cleaning activities under Subpart 2.1.</p>
2.5 Receiving, Storage and Handling		
<p>Receiving, storage and handling activities required by this standard shall be performed in accordance with ANSI N45.2.2</p>		<p>NQA-1, Part II addresses receiving, storage, and handling activities under Subpart 2.2.</p>
2.6 Housekeeping		
<p>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.</p>		<p>NQA-1, Part II addresses housekeeping activities under Subpart 2.3.</p>

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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.		NQA-1, Part I addresses inspection and testing qualifications under Supplements 2S-1 and 2S-2.
2.8 Measuring and Test Equipment		NQA-1 addresses Measuring and Test Equipment under Basic Requirement 12, Supplement 12S-1, and Subpart 2.16.
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.		
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. If no national standards exist, the basis for calibration shall be documented. Records of calibrations shall be maintained and equipment suitably marked so that the calibration status can be determined. Records of calibration shall be included in inspection and test results where applicable. 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. 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. Where necessary to determine the		

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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 responsible organizations may be used.		
2.9 Prerequisites	2.2 Prerequisites	
<p>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:</p> <p>a. Qualification of individuals, organizations and procedures have been completed in accordance with the requirements of applicable codes and standards.</p> <p>b. Systems have been designed and engineered in accordance with applicable codes, standards and specifications.</p> <p>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.</p> <p>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, manufacturers data sheets, instruction manual and design reports.</p>	<p>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.</p> <p>(a) Qualification of individuals, organizations, and procedures have been completed in accordance with the requirements of applicable codes and standards.</p> <p>(b) Systems have been designed and engineered in accordance with applicable codes, standards, and specifications.</p> <p>(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.</p> <p>(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.</p>	<p>Similar requirement. ANSI N45.2.8 refers to “construction site” and NQA-1-1994 uses “work site.” This is in line with the standard being applicable to construction and operational activities.</p>

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<p>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:</p> <p>(1) The latest applicable approved-for-construction drawings.</p> <p>(2) Equipment specifications.</p> <p>(3) Manufacturers installation instructions.</p> <p>(4) Installation procedures.</p> <p>(5) Evidence of compliance by manufacturer with purchase requirements, including quality assurance requirements.</p> <p>(6) Evidence that engineering or design changes are documented and approved prior to installation.</p> <p>(7) Records of inspections and tests during onsite receiving, storage and handling.</p> <p>(8) Release of mechanical items for installation.</p> <p>(9) Evidence that nonconformances have been satisfactorily resolved or controlled.</p>	<p>(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:</p> <p>(1) the latest applicable approved-for-construction drawings</p> <p>(2) equipment specifications</p> <p>(3) manufacturer's installation instructions</p> <p>(4) installation procedures</p> <p>(5) evidence of compliance by manufacturer with purchase requirements, including quality assurance requirements</p> <p>(6) evidence that engineering or design changes are documented and approved prior to installation</p> <p>(7) records of inspections and tests during on-site receiving, storage, and handling</p> <p>(8) release of mechanical items for installation</p> <p>(9) evidence that nonconformances have been satisfactorily resolved or controlled</p>	
3. PRE-INSTALLATION VERIFICATION	3 PREINSTALLATION VERIFICATION	
3.1 General	3.1 General	
<p>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. 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.</p>	<p>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.</p> <p>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.</p>	<p>Similar requirement.</p>

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<p>3.2 Identification</p> <p>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. If these checks disclose apparent loss of identification, the identity shall be reaffirmed prior to release for installation.</p> <p>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. The procedures for control of identification shall provide a system of traceability to drawings, specifications or other records when identification or markings must be destroyed, hidden or removed from an item.</p>	<p>3.2 Identification</p> <p>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. If these checks disclose apparent loss of identification, the identity shall be reaffirmed prior to release for installation.</p> <p>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. The procedures for control of identification shall provide a system of traceability to drawings, specifications, or other records when identification or markings must be destroyed, hidden, or removed from an item.</p>	<p>Similar requirement.</p>
<p>3.3 Processes and Procedures</p> <p>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. These inspections or checks shall include, but not be limited to the following verifications:</p> <ul style="list-style-type: none"> a. Approved procedures, drawings, manuals or other work instructions are provided to the installer at the construction site. b. Special instructions and check lists as required are available at the installation area or attached to the item. c. Approved procedures and instructions for special processes such as coating, welding, heat treating and nondestructive examination are available at the site. d. Where applicable, personnel, procedures and 	<p>3.3 Processes and Procedures</p> <p>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. These inspections or checks shall include, but not be limited to, the following verifications.</p> <ul style="list-style-type: none"> (a) Approved procedures, drawings, manuals, or other work instructions are provided to the installer at the work site. (b) Special instructions and checklists as required are available at the installation area or attached to the item. (c) Approved procedures and instructions for special processes such as coating, welding, heat treating, and nondestructive examination are available at the site. (d) Where applicable, personnel, procedures, and 	<p>Similar requirement.</p>

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<p>instructions shall have been qualified through the preparation of workmanship standards, samples, or mockups that simulate actual job conditions.</p> <p>e. Installation preparations have been completed, including such tasks as removal of packaging, conditioning, cleaning, and preliminary positioning.</p> <p>f. Jigs, fixtures and equipment for special processes, if required, are available at the site and conform to specified requirements.</p> <p>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.</p> <p>h. Warnings and safety notices, appropriate to the activity, are posted.</p>	<p>instructions shall have been qualified through the preparation of workmanship standards, samples, or mockups that simulate actual job conditions.</p> <p>(e) Installation preparations have been completed, including such tasks as removal of packaging, conditioning, cleaning, and preliminary positioning.</p> <p>(f) Jigs, fixtures, and equipment for special processes, if required, are available at the site and conform to specified requirements.</p> <p>(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.</p> <p>(h) Warnings and safety notices appropriate to the activity are posted.</p>	
3.4 Physical Condition	3.4 Physical Condition	
<p>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. These inspections or checks shall include, but not be limited to, the following verifications:</p> <p>a. Protective measures and physical integrity during storage have been maintained in conformance with specified requirements.</p> <p>b. Nonconformances have been satisfactorily dispositioned or controlled.</p> <p>c. Items have been cleaned in accordance with specified requirements.</p>	<p>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. These inspections or checks shall include, but not be limited to, the following verifications.</p> <p>(a) Protective measures and physical integrity during storage have been maintained in conformance with specified requirements.</p> <p>(b) Nonconformances have been satisfactorily dispositioned or controlled.</p> <p>(c) Items have been cleaned in accordance with specified requirements.</p>	<p>Similar requirement.</p>
3.5 Site Conditions	3.5 Site Conditions	
<p>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</p>	<p>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</p>	<p>Similar requirement.</p>

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<p>of the item during installation. These inspections or checks shall include, but not be limited to, the following to verify that:</p> <p>a. Protection from adjacent construction activities is being provided including, implementation of appropriate exclusion and area cleanliness requirements.</p> <p>b. Protection from inclement weather and other ambient conditions adverse to quality is being provided.</p> <p>c. Materials that may be deleterious to the mechanical items being installed, are controlled.</p> <p>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.</p> <p>e. Nonconformances for adjacent items have been dispositioned or controlled.</p> <p>f. Adequate permanent or approved temporary supports and mountings have been installed that will properly interface with the mechanical item.</p> <p>g. Mating parts such as couplings and flanges are properly positioned and conditioned.</p> <p>h. Servicing or maintenance activity related to installation has been performed.</p>	<p>the items during installation. These inspections or checks shall include, but not be limited to, verification of the following.</p> <p>(a) Protection from adjacent construction activities is being provided, including implementation of appropriate exclusion and area cleanliness requirements.</p> <p>(b) Protection from inclement weather and other ambient conditions adverse to quality is being provided.</p> <p>(c) Materials that may be deleterious to the mechanical items being installed are controlled.</p> <p>(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.</p> <p>(e) Nonconformances for adjacent items have been dispositioned or controlled.</p> <p>(f) Adequate permanent or approved temporary supports and mountings have been installed that will properly interface with the mechanical item.</p> <p>(g) Mating parts such as couplings and flanges are properly positioned and conditioned.</p> <p>(h) Servicing or maintenance activity related to installation has been performed.</p>	
4. CONTROL DURING INSTALLATION PROCESS	4 CONTROL DURING INSTALLATION PROCESS	
4.1 General	4.1 General	
<p>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. These activities shall be performed in a systematic manner to assure surveillance throughout the installation process. A procedure shall be provided for the coordination and</p>	<p>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. These activities shall be performed in a systematic manner to assure surveillance throughout the installation process. A procedure shall be provided for the coordination and</p>	<p>Similar requirement.</p>

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sequencing of these activities at established inspection points in successive stages of installation. A method shall be implemented to assure that engineering and design changes are documented and controlled during installation.	sequencing of these activities at established inspection points in successive stages of installation. A method shall be implemented to assure that engineering and design changes during installation are documented and controlled.	
4.2 Process and Procedure Control	4.2 Process and Procedures Control	
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: a. The applicable revision of approved procedures, drawings and instructions are being followed. b. Qualified and approved processes, materials, tools and other equipment are being, used by qualified personnel. c. The status of installation, inspections, examinations or tests is clearly indicated or identified in inspection records. d. The installation, inspection and testing sequence is being maintained. e. Identification, appropriate segregation, and disposition of nonconforming items are being controlled. f. "As-built" information is being processed. g. Inspection and test reports are current, accurate and complete.	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. (a) The applicable revision of approved procedures, drawings, and instructions is being followed. (b) Qualified and approved processes, materials, tools, and other equipment are being used by qualified personnel. (c) The status of installation, inspections, examinations, or tests is clearly indicated or identified in inspection reports. (d) The installation, inspection, and testing sequences are being maintained. (e) Identification, appropriate segregation, and disposition of nonconforming items are being maintained. (f) As-built information is being processed. (g) Inspection and test reports are current, accurate, and complete.	Similar requirement.
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.		NQA-1 doesn't contain this wording, but NDE is programmatically controlled under Basic Requirements 10 and 11 and Supplements 10S-1 and 11S-1.
4.4 Inspection	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 latest approved-for-construction drawings, manufacturers instructions, codes, installation	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 approved-for-construction drawings, manufacturer's instructions, and procedures.	Similar requirement.

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<p>instructions and procedures. Inspections performed shall include as appropriate, but not be limited to the following:</p> <ul style="list-style-type: none"> a. Identification. b. Location and orientation of components. c. Leveling and alignment. d. Clearances and tolerances. e. Tightness of connections and fastenings. f. Fluid levels and pressures. g. Absence of leakage. h. Physical integrity. i. Cleanness. j. Welding operations including materials and process controls, adequate purging, and the removal of purge dams on completion. k. Adequacy of protective measures to assure that the item will not be damaged during installation. 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 	<p>Inspections performed shall include as appropriate, but not be limited to, the following:</p> <ul style="list-style-type: none"> (a) identification (b) location and orientation of components (c) leveling and alignment (d) clearances and tolerances (e) tightness of connections and fastenings (f) fluid levels and pressures (g) absence of leakage (h) physical integrity (i) cleanness (j) welding operations, including materials and process controls, adequate purging, and the removal of purge dams on completion (k) adequacy of protective measures to assure that the item will not be damaged during installation (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 	
<p>4.5 Installation Checks</p> <p>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. 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.</p> <p>These activities shall include as appropriate, but not be limited to the following:</p> <ul style="list-style-type: none"> a. Checkout procedures are prepared and approved to verify correctness of installation and ability to function. b. Proper greasing or lubrication has been completed. 	<p>4.4 Installation Checks</p> <p>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. 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.</p> <p>These activities shall include as appropriate, but not be limited to, the following.</p> <ul style="list-style-type: none"> (a) Checkout procedures are prepared and approved to verify correctness of installation and ability to function. (b) Proper greasing or lubrication has been completed. 	<p>Similar requirement.</p>

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<p>c. Lubricating and cooling water systems are in service. d. Protection strainers are installed where necessary. e. Rotation of prime movers is correct. f. Electrical circuits, controls and relay settings are correct. g. Phasing of electrical busses is correct. h. Instrumentation is calibrated and in service as required. i. Item is correctly valved and isolated. j. Casings, reservoirs, etc. are primed, vented and filled. k. Proper communications are established for control. l. Tags are issued, where appropriate, for isolation and control. m. Piping system alignment is correct. n. Pipe hanger placement is correct and hangers will function properly. o. Seismic anchors and restraints are properly installed. p. Valve glands and packing are installed. q. Pneumatic lines have been blown. r. Valve stroking, actuation and settings are proper. s. Pump seals and packing are properly installed. t. Limit switches, interlocks and stops are properly adjusted and set.</p>	<p>(c) Lubricating and cooling water systems are in service. (d) Protection strainers are installed where necessary. (e) Rotation of prime movers is correct. (f) Electrical circuits, controls, and relay settings are correct. (g) Phasing of electrical buses is correct. (h) Instrumentation is calibrated and in service as required. (i) Item is correctly valved and isolated. (j) Casings, reservoirs, etc., are primed, vented, and filled. (k) Proper communications are established for control. (l) Tags are issued, where appropriate, for isolation and control. (m) Piping system alignment is correct. (n) Pipe hanger placement is correct and hangers will function properly. (o) Seismic anchors and restraints are properly installed. (p) Valve glands and packing are installed. (q) Pneumatic lines have been blown. (r) Valve stroking, actuation, and settings are proper. (s) Pump seals and packing are properly installed. (t) Limit switches, interlocks, and stops are properly adjusted and set.</p>	
<p>4.5.1 Cleaning.</p>	<p>4.4.1 Cleaning.</p>	
<p>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: a. Chemical Conditioning. Procedures shall be prepared including the scope, acceptance criteria, sequence, temperatures, soak periods and neutralizing solutions to be used. Checks shall be made to verify that the proper chemicals at the designated strength and temperature are</p>	<p>Installed systems and components shall be cleaned, flushed, and conditioned according to applicable requirements. Special attention shall be given to the following requirements. (a) Chemical Conditioning. Procedures shall be prepared including the scope, acceptance criteria, sequence, temperatures, soak periods, and neutralizing solutions to be used. Checks shall be made to verify that the proper chemicals at the designated strength and temperature are</p>	<p>Similar requirement. As noted previously, NQA-1 addresses cleaning and flushing of components and systems in Subpart 2.1.</p>

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<p>being used in the conditioning operations. Other operations shall be performed as specified in Paragraph 4.5.1.c.</p> <p>b. Flushing. Procedures shall be prepared including routes, boundaries, velocities and acceptance criteria, restoration, and lay-up for high integrity systems where appropriate. 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. Other operations shall be performed as specified in Paragraph 4.5.1.c.</p> <p>c. Process Controls. Checks shall be performed to verify that controls are functioning for the following:</p> <ol style="list-style-type: none"> (1) Removal and installation of parts 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. (3) Isolation of sensitive instrumentation. (4) Water and chemical quality. (5) Acceptance data, specimens, or progressive samples if required. <p>Where appropriate for disassembly and reassembly of components, procedures or instructions shall be prepared or manufacturers technical manuals shall be used to assure adherence to match marks, protection of seats and proper reassembly and to preclude damage to the component.</p>	<p>being used in the conditioning operations. Other operations shall be performed as specified in (c) below.</p> <p>(b) Flushing. Procedures shall be prepared including routes, boundaries, velocities and acceptance criteria, restoration, and lay-up for high integrity systems, where appropriate. 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. Other operations shall be performed as specified in (c) below.</p> <p>(c) Process Controls. Checks shall be performed to verify that controls are functioning for the following:</p> <ol style="list-style-type: none"> (1) removal and installation of parts 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; (3) isolation of sensitive instrumentation; (4) water and chemical quality; (5) acceptance data, specimens, or progressive samples, if required. <p>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.</p>	
4.5.2 Pressure Testing.	4.4.2 Pressure Testing.	
<p>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</p>	<p>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</p>	<p>Similar requirement. NQA-1 adds requirement for verifying evidence of calibration of test gages.</p>

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<p>specified requirements. The purpose of the test, scope, test boundary, duration for inspection, acceptance criteria, restoration, and lay-up shall be clearly established and documented. Checks shall include, but not be limited to, the following:</p> <ul style="list-style-type: none"> a. Appropriate pressures, temperatures, water chemistry, and pressure test cycles are established. b. Sufficient time at test pressure is specified to determine acceptance. c. Provisions are available to protect and isolate instrumentation during hydrostatic testing. d. Items external to test boundary are protected to prevent inadvertent over-pressurization. e. Relief devices are controlled to prevent system over-pressurization. f. Gagging and ungagging of relief valves. g. Piping and equipment supports have hydrostatic pins installed where applicable for testing and removed upon completion of testing. 	<p>specified requirements. The purpose of the test, scope, test boundary, duration for inspection, acceptance criteria, restoration, and lay-up shall be clearly established and documented. Checks shall include, but not be limited to, the following.</p> <ul style="list-style-type: none"> (a) Appropriate pressures, temperatures, water chemistry, and pressure test cycles are established. (b) Sufficient time at test pressure is specified to determine acceptance. (c) Provisions are available to protect and isolate instrumentation during hydrostatic testing. (d) Items external to test boundary are protected to prevent inadvertent over-pressurization. (e) Relief devices are controlled to prevent system over-pressurization. (f) Gagging and ungagging of relief valves. (g) Piping and equipment supports have hydrostatic pins installed where applicable for testing and are to be removed upon completion of testing. (h) Evidence of calibration of test gages 	
4.6 Care of Items	4.5 Care of Items	
<p>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, chipping, burning and stress relieving that 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. Temporary use of equipment or facilities to which this standard applies that are to become part of the completed project may be</p>	<p>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, 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. Temporary use of equipment or facilities to which this Part applies that are to become part of the completed project may be desirable. Authorization for such usage shall be as</p>	<p>Similar requirement.</p>

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<p>desirable. Authorization for such usage shall be as provided for in the contract or by written approval from the responsible organization. Such temporary use shall not subject the equipment or systems to conditions for which they were not designed.</p> <p>The temporary use authorization shall include:</p> <p>(1) conditions of use or operation;</p> <p>(2) maintenance requirements; and</p> <p>(3) inspections and tests as required to maintain operability and quality during period of temporary use of the item.</p> <p>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.</p>	<p>provided for in the contract or by written approval from the responsible organization. Such temporary use shall not subject the equipment or systems to conditions for which they were not designed.</p> <p>The temporary use authorization shall include:</p> <p>(a) conditions of use or operation;</p> <p>(b) maintenance requirements; and</p> <p>(c) inspections and tests as required to maintain operability and quality during the period of temporary use of item.</p> <p>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.</p>	
5. INSTALLED SYSTEMS INSPECTION AND TESTS	5 INSTALLED SYSTEMS INSPECTION AND TESTS	
5.1 General	5.1 General	
<p>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. This is a final verification that the requirements defined by licensing commitments, drawings, specifications and other contract documents are reflected in the completed installation. 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.</p> <p>Controls shall be provided for the identification, documentation, and resolution of nonconformances disclosed by inspections or tests. Tests shall be conducted on completed plant systems. Test procedures shall identify prerequisites for system testing including required</p>	<p>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. This is a final verification that the requirements defined by licensing commitments, drawings, specifications, and other contract documents are reflected in the completed installation. 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.</p> <p>Controls shall be provided for the identification, documentation, and resolution of nonconformances disclosed by inspections or tests.</p> <p>Tests shall be conducted on completed plant systems. Test procedures shall identify prerequisites for system testing,</p>	<p>Similar requirement.</p>

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<p>completed construction activities. The test procedure shall identify and describe any temporary or simulated condition or equipment. 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. Written verification shall also be provided that temporary installations have been satisfactorily replaced by the permanent installations. 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. These checks and inspections shall be performed to verify the following as a minimum:</p> <ul style="list-style-type: none"> a. Equipment and materials have not sustained external physical damage. b. The installation has been made in accordance with specified requirements. c. All nonconforming items have been satisfactorily dispositioned. d. Internal and external restrictions and obstructions to flow and full travel have been removed. e. Supports and restraints are properly installed. f. Interfacing connections with adjacent systems are compatible. g. Original material and component identification has been preserved with provisions for traceability throughout the installed systems. 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. i. Temporary, connections such as jumpers and bypass 	<p>including required completed construction activities. The test procedures shall identify and describe any temporary or simulated condition or equipment. 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. Written verification shall also be provided that temporary installations have been satisfactorily replaced by permanent installations. 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. These checks and inspections shall be performed to verify the following, as a minimum.</p> <ul style="list-style-type: none"> (a) Equipment and materials have not sustained external physical damage. (b) The installation has been made in accordance with specified requirements. (c) All nonconforming items have been satisfactorily dispositioned. (d) Internal and external restrictions and obstructions to flow and full travel have been removed. (e) Supports and restraints are properly installed. (f) Interfacing connections with adjacent systems are compatible. (g) Original materials and component identification have been preserved with provisions for traceability throughout the installed systems. (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. (i) Temporary connections, such as jumpers and bypass 	

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<p>lines and temporary trip points of control equipment are identified and, documented so that their final condition can be verified.</p> <p>j. System water chemistry is appropriate for operational testing.</p> <p>k. External surface chemistry requirements have been maintained.</p> <p>1. Permits and authorizations have been obtained.</p>	<p>lines, and temporary trip points of control equipment are identified and documented so that their final condition can be verified.</p> <p>(i) System water chemistry is appropriate for operational testing.</p> <p>(k) External surface chemistry requirements have been maintained.</p> <p>(I) Permits and authorizations have been obtained.</p>	
<p>5.2 Preoperational Testing</p>	<p>5.2 Preoperational Testing</p>	
<p>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:</p> <p>a. Systems integrity.</p> <p>b. In-line instrument installation is consistent with specified flow directions.</p> <p>c. Sensing lines are phased correctly to in-line elements and sensors.</p> <p>d. Service requirements for initial operation such as flow alignments, limiting flow orificing and relief devices have been performed.</p> <p>e. Operation of controls, valves, dampers, operators, and load limiting devices.</p> <p>f. Rotating equipment (motors, pumps, blowers) - rotation, speed, vibration, noise, and no-load operation.</p> <p>g. Handling equipment - load tests of cranes, hoists, conveyors, hooks, and handling adapters, and accessories.</p> <p>h. Containment systems.</p> <p>i. Air handling systems.</p> <p>j. Fuel storage and handling systems.</p> <p>k. Reactor components handling systems.</p> <p>1. Instrument air systems.</p>	<p>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.</p> <p>The testing shall include, but not be limited to, the following:</p> <p>(a) systems integrity;</p> <p>(b) in-line instrument installation is consistent with specified flow directions;</p> <p>(c) sensing lines are phased correctly to in-line elements and sensors;</p> <p>(d) service requirements for initial operation such as flow alignments, limiting flow orificing, and relief devices have been performed;</p> <p>(e) operation of controls, valves, dampers, operators, and load limiting devices;</p> <p>(f) rotating equipment (motors, pumps, blowers), rotation, speed, vibration, noise, and no-load operation;</p> <p>(g) handling equipment (load tests of cranes, hoists, conveyors, hooks, handling adapters, and accessories);</p> <p>(h) containment systems;</p> <p>(i) air handling systems;</p> <p>(j) fuel storage and handling systems;</p> <p>(k) reactor component handling systems;</p>	<p>Similar requirement.</p>

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m. Fluid service systems. n. Waste effluent systems. o. Auxiliary building systems.	(l) instrument air systems; (m) fluid service systems; (n) waste effluent systems; (o) auxiliary building systems.	
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. For additional information on inspections, tests and procedures, see Section 6 of ANSI N18.7.	Where mechanical equipment and systems interface with, and their operation must coordinate with, nonmechanical equipment or systems, the test performed shall include verifying the compatibility of interfacing equipment and functions.	Similar requirement. Additional information on inspections and tests is addressed in NQA-1, Basic Requirements 10 and 11, and Supplements 10S-1 and 11S-1.
5.3 Cold Functional Tests	5.3 Cold Functional Tests	
These tests follow preoperational testing of individual systems including reactor coolant systems. 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 functional performance of these systems..	These tests follow preoperational testing of individual systems, including reactor coolant systems. This testing shall be performed to obtain operational data of equipment and maximum allowable simultaneous operation of interfacing systems and equipment, the final verification of functional performance of these systems.	Similar requirement.
5.3.1 Reactor Coolant System Hydrostatic Tests.	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. The applicable test requirements are contained in Section III of the Code.	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. The applicable test requirements are contained in Section III of the ASME Boiler and Pressure Vessel Code.	Similar requirement.
5.3.2 Functional and Flow Testing.	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. These tests, where appropriate, shall demonstrate the following: a. System pressure drop.	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. These tests, where appropriate, shall demonstrate the following: (a) system pressure drop	Similar requirement.

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b. Flow rate. c. Controls and throttling device settings. d. Function of interlocks, alarms and automatic features. e. Instrument calibration. f. Setting of meter biases. g. Systems stability. h. Adequacy of pipe and equipment support settings. I. Heat runs on rotating equipment. j. Adequacy of ventilation, lubrication and cooling systems under sustained operating conditions. k. Ability to meet water chemistry requirements	(b) flow rate (c) controls and throttling device settings (d) function of interlocks, alarms, and automatic features (e) instrument calibration (f) setting of meter biases (g) system stability (h) adequacy of pipe and equipment support settings (i) heat runs on rotating equipment (j) adequacy of ventilation, lubrication, and cooling systems under sustained operating conditions (k) ability to meet water chemistry requirements	
5.4 Hot Functional Tests	5.4 Hot Functional Tests	
<p>These tests are not applicable to BWR and HTGR nuclear plants because these plants use nuclear heat to produce the system temperatures. Hot functional tests for PWR plants follow cold functional tests and simulate plant operating conditions at elevated temperatures and pressures. All auxiliary and support systems exclusive of those required for pre-criticality testing must be available for these tests. 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.</p> <p>These systems shall include the following as a minimum:</p> a. System pressure drop. b. Flow rate. c. Controls and throttling device settings. d. Function of interlocks, alarms and automatic features. e. Instrument calibration. f. Setting of meter biases. g. Systems stability. h. Adequacy of pipe and equipment support settings. I. Heat runs on rotating equipment.	<p>These tests are not applicable to BWR and HTGR nuclear plants because these plants use nuclear heat to produce the system temperatures. Hot functional tests for PWR plants follow cold function tests and simulate plant operating conditions at elevated temperatures and pressures. All auxiliary and support systems exclusive of those required for precriticality testing must be available for these tests. If any of these systems is not available, the responsible organization shall specifically authorize exclusion of these systems from testing and document those exceptions.</p> <p>These systems shall include the following as a minimum:</p> (a) system pressure drop (b) flow rate (c) controls and throttling device settings (d) function of interlocks, alarms, and automatic features (e) instrument calibration (f) setting of meter biases (g) system stability (h) adequacy of pipe and equipment support settings (i) heat runs on rotating equipment	Similar requirement.

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j. Verification of heat exchanger performance. k. Verification of boron control system performance. 1. Thermal insulation effectiveness. m. Set points of temperature, pressure and level devices. n. System heatup tests. o. System cooldown tests. p. Hot flow tests. q. Setting protective devices. r. Hot clearances. s. Vibration measurements of major equipment and piping, as applicable.	(j) verification of heat exchanger performance (k) verification of boron control system performance (l) thermal insulation effectiveness (m) set points of temperature, pressure, and level devices (n) system heatup tests (o) system cooldown tests (p) hot flow tests (q) setting protective devices (r) hot clearances (s) vibration measurements of major equipment and piping, as applicable	
6. DATA ANALYSIS AND EVALUATION	6 DATA ANALYSIS AND EVALUATION	
<p>Procedures shall be established for processing inspection and test data and their analysis, evaluation, and final acceptance. 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. 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 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. 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.</p>	<p>Procedures shall be established for processing inspection and test data and their analysis, evaluation, and 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. 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. 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. 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.</p>	<p>Similar requirement.</p>
7. RECORDS	7 RECORDS	
<p>Record copies of completed procedures; reports; required</p>	<p>Record copies of procedures, reports, required</p>	<p>Similar requirement. NQA-1 establishes</p>

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<p>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. Collection, storage and maintenance of quality assurance records shall be in accordance with ANSI N45.2.9.</p>	<p>qualification records, test equipment calibration records, test deviation or exception records, and inspection, examination, and check records shall be prepared. These records shall be retained with other project records as required by code, standard, specification, or project procedures.</p>	<p>requirements for collection, storage, and maintenance of records in Part I, Basic Requirement 17 and Supplement 17S-1.</p>
<p>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 Inspection, Examination and Testing Personnel for the Construction Phase of Nuclear Power Plants N45.2.9-1974 Requirements for Collection, Storage and</p>		<p>See the comment associated with N45.2.8 § 1.5 regarding referenced standards.</p>

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Maintenance of Quality Assurance Records for Nuclear Power Plants N45.2.10-1973 Quality Assurance Terms and Definitions		

ANSI N45.2.2-1972, Section 7. Handling	Quality Assurance Requirements for Hoisting, Rigging, and Transporting Items for Nuclear Power Plants NQA-1 1994 Subpart 2.15	COMMENTS
Note: Some of this information was previously addressed in ANSI N45.2.2-1972 and endorsed by NRC Regulatory Guide 1.38-Rev. 2. Applicable sections are shown below. One Regulatory Position and VA alternative are described below regarding re-rating of hoisting equipment (NQA-1, § 6.1.4).		
	1 GENERAL	
	Subpart 2.15 provides requirements for the design, manufacture, acceptance, testing, and use of hoisting, rigging, and transporting equipment to maintain the quality of designated nuclear power plant items which require special handling. 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 2.15.	This subpart of NQA-1 addresses additional functions above the actual handling discussed in N45.2.2, Section 7.
1.4 Definitions	1.1 Definitions	
The following definitions are provided to assure a uniform understanding of select terms as they are used in this standard.	The following definitions are provided to assure a uniform understanding of unique terms as they are used in Subpart 2.15.	NQA-1 includes additional definitions above what was in N45.2.2.
	accepted industry standard - a standard established by a group representing individual members from various facets of an industry who normally are those engaged in manufacturing. This standard is accepted by the responsible organization. Examples are: AGMA - American Gear Manufacturers Association AISC - American Institute of Steel Construction AISE - Association of Iron and Steel Engineers	
	consensus standard - a standard established by a group representing a cross section of a particular industry or trade, or a part thereof. A cross section includes those who purchase or use a product of the industry or trade, as well as those who produce these products.	
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, lowered, rotated, or transported through motions and accelerations required to simulate handling of the intended item	Similar

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	equipment - manufactured assemblies which are used for the handling of items	
	failure stress - that stress at which failure is imminent due to direct loads, excessive deflections or vibrations, or permanent deformations that may lead to unsafe conditions	
	handled load - the weight of the item to be lifted plus the weight of any required rigging, such as lifting beam, slings, hooks, and blocks	
<i>Handling</i> - The act of physically moving items by hand or by mechanical machinery, not including transport modes.	handling - hoisting, rigging, or transporting of items for nuclear power plants	Similar intent, but NQA-1 includes transport as part of handling.
	person-in-charge (PIC) - the person who has overall responsibility for handling operations for his organization	
	principal load carrying members - those components of a system whose structural integrity must be maintained to ensure a safe operation	
	principal structural welds - those welds which join or affect the integrity of principal load carrying members	
	responsible organization - a company which is in direct charge of the equipment and manpower actually engaged in a handling operation	
	system - a combination of components arranged for a handling operation	
7.1 General	2 GENERAL REQUIREMENTS	
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.	The requirements of Subpart 2.15 apply to any organization or individual participating in work relating to hoisting, rigging, and transporting. Hoisting equipment used for handling shall be certified by the manufacturer. The certification shall indicate the various parameters for the maximum load to be handled. Measures shall be established and implemented to perform handling activities for nuclear power plant items (see Subpart 2.2, para. 2.2) and to perform the inspections, examinations, testing, and documentation to verify conformance to specified requirements. These measures are applicable to items that require special handling because of weight, size, susceptibility	Similar, but addresses the added scope of the standard. Includes relevant general information of N45.2.2, subsection 7.2.

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	<p>to shock damage, high nil-ductility transition temperatures, or any other conditions that warrant special instructions to preserve the quality of items and container. Where this Subpart references the use of consensus standards, these measures shall include the applicable requirements of the ASME/ANSI B30 series, Safety Standards for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings, and of ANSI/ASME A 1 0.5, Safety Requirements for Material Hoists. Subpart 2.15 applies from the time these items are ready for delivery.</p> <p>Use of permanent plant handling equipment during the construction phase is prohibited unless specifically authorized by the plant owner and conducted in accordance with the plant owner's Quality Assurance Program. If such equipment is to be used during the construction phase, it shall be reviewed to assure that such use conforms to paras. 4.1, 4.2, and 4.3; paras. 5.1, 5.2, and 5.3; paras. 6.1, 6.2, and 6.3, and Section 7, as applicable, in addition to the other requirements of Subpart 2.15.</p> <p>After construction use and prior to release to the owner, the permanent plant handling equipment shall be restored to its design configuration, and it shall be inspected and tested as specified in a procedure furnished by the owner or his designee.</p> <p>During subsequent use, the testing, inspection, and maintenance shall be performed as specified by applicable standards.</p> <p>The requirements of Subpart 2.15 may also be extended to other appropriate parts of nuclear power plants when specified in contract documents, or to modifications involving operating plants. For other requirements, see applicable sections of Subpart 2.2.</p>	
7.2 Methods and Procedures	2.1 Planning and Procedures	
Detailed handling instructions and procedures shall be prepared for all items that require special handling instructions because	Planning and procedure preparation shall be in accordance with the requirements of the introduction to this Part (Part II).	Similar requirements, includes requirement to comply with

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<p>of weight, size, susceptibility to shock damage, high nil ductility transition temperatures, or any other conditions that warrant special instructions. 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. Items not specifically covered above shall be handled in accordance with sound material handling practices.</p>	<p>Procedures and instructions shall contain sufficient detail such as weights, sling locations, balance points, methods of attachment, maximum hoist line speeds, and other pertinent features to be considered as necessary for safe handling to govern handling operations, inspection thereof, and documentation in accordance with this Part. Planning shall provide for compliance with applicable federal, state, and local regulations.</p>	<p>applicable regulations.</p>
	<p>2.2 Classification of Items Handled</p>	
	<p>The requirements for activities covered by Subpart 2.15 are based on classifying the items into three categories according to their important physical characteristics. It is recognized that within the scope of each category there may be a range of controls, and that the need for, and extent of detailed handling requirements for an item, is dependent on the importance of the item to safe, reliable operation of the plant and the complexity of the operation. Pertinent manufacturer's requirements shall be considered when classifying the items. Items for which handling activities are covered by Subpart 2.15 shall be classified into one of the three categories below. An item shall not be reclassified to a lower status without approval by the responsible organization which assigned the original category.</p>	<p>Classification not addressed in N45.2.2, and the current programs may not specifically use these categories. Alternative proposed to not necessarily use these specific category designations, but ensure the applicable requirements are met for the individual handling operations.</p>
	<p>2.2.1 Category A.</p>	
	<p>Items classified in Category A are those that require specially selected equipment and detailed procedures for handling operations because of large size and weight. Examples of items that may be assigned to this category are:</p> <ul style="list-style-type: none"> (a) reactor vessels (b) steam generators (c) major components of reactor vessel internals (d) primary system pressurizers (e) spent fuel casks (f) subassemblies requiring specially selected equipment 	

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	because of size or weight, such as prestressed concrete reactor vessel liners	
	2.2.2 Category B	
	<p>Items classified in Category B are those that may be handled with conventional handling equipment but which require detailed procedures because of the susceptibility to damage. Examples of items that may be assigned to this category are:</p> <ul style="list-style-type: none"> (a) reactor vessel head (b) primary and intermediate coolant pumps and their internals (c) designated instrument cabinets and control boards (d) control rod drive mechanisms (e) helium circulators (f) fuel handling equipment (g) purification equipment (h) fuel (i) core components (small) 	
	2.2.3 Category C.	
	<p>Items classified in Category C are those that may be handled with conventional equipment using sound rigging practice. Included in this category are both construction and permanent plant items not included in Categories A and B.</p>	
	3 TYPES OF HANDLING EQUIPMENT	
	<p>Equipment used for handling of items, as covered by this Part, can be divided into four general types. Paragraphs 3.1, 3.2, 3.3, and 3.4 define these four types of handling equipment and list some examples.</p>	
	3.1 Standard Manufactured Component	
	<p>Handling equipment classed as a standard manufactured component is equipment which is available for several sources. This equipment is normally a catalog item, generally kept in stock, and normally used as a component of a handling system. Examples of standard manufactured components are:</p> <ul style="list-style-type: none"> (a) chains and chain accessories such as hooks, shackles, and links; (b) fiber ropes and accessories; 	

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	(c) hooks such as link or eye type, single, sister, and miscellaneous; (d) transporting devices such as casters, rollers, shoes, and wheels; (e) wire rope and wire rope accessories such as blocks, clamps, sockets, thimbles, and turnbuckles; (f) miscellaneous items such as cribbing, eyebolts, pads, swivel devices, links, shackles, and sheaves.	
	3.2 Commercial Standard Design Equipment	
	Commercial standard design equipment for handling is equipment which is available as an item of standard design and manufacture. Examples of commercial standard design equipment are: (a) gantry, mobile, overhead, and jib cranes; (b) guys and stiffleg derricks; (c) hoists, winches, and trolleys; (d) jacks and jacking systems; (e) transporting devices such as forklift trucks, railcars, tractors, trailers, and transporters; (f) elements of commercial standard design equipment such as booms, masts, and struts; (g) other optional standard accessories and adaptations available from the equipment manufacturer,	
	3.3 Special Designed Equipment	
	Special designed equipment for handling is equipment which is not available from a commercial source as a catalog or standard designed item, or equipment for which no generally accepted consensus standard exists. This type of equipment may be designated and fabricated by using standard manufactured components and commercial standard designed equipment or by using a combination of nonstandard and standard equipment. Examples of special designed equipment are: (a) special gin poles, derricks, and jacking towers; (b) special crane supports such as runways, columns, and	

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	frames; (c) rigging devices such as spreader beams, strongbacks, upend and downend devices, bolsters, and yokes; (d) transporting systems such as dollies, special rail cars, and transporters.	
	3.4 Permanent Plant Handling Equipment	
	Permanent plant handling equipment employed for handling nuclear plant items is equipment which is intended primarily for maintenance and operation of the nuclear power plant but which may also be used for construction. It may consist of standard manufactured components as defined in para. 3.1, commercial standard design equipment as defined in para. 3.2, or special designed equipment as defined in para. 3.3. Examples of permanent plant handling equipment are: (a) fuel handling equipment; (b) overhead and gantry cranes for reactor and auxiliary (spent fuel) buildings.	
	4 DESIGN REQUIREMENTS	
	Due to the wide range of equipment normally used in the handling of items for nuclear plants, it is appropriate that different criteria be used for designing different types of handling equipment. This Section describes specific design criteria which are appropriate for most applications and which are recommended for general use. If it can be shown that these criteria are not appropriate for specific application, the engineer responsible shall select compatible criteria and document the justification. It is recognized that some items are also covered by other standards, which may be more stringent than Subpart 2.15, and items must meet requirements of both. Hoisting, rigging, and transporting equipment which is to be used exclusively during the construction phase shall be designed in accordance with paras. 4.1, 4.2, and 4.3. Permanent plant handling equipment is designed and selected in accordance with other standards. The organization responsible for the design shall establish a	

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	program for assuring that the handling equipment conforms to the design requirements of the applicable portions of Subpart 2.15.	
	4.1 Standard Manufactured Components	
	Standard manufactured components shall be selected to safely perform the intended operations structurally, mechanically, and electrically. They shall have been designed to conform to accepted industry standards.	
	4.2 Commercial Standard Design	
	Commercial standard design equipment shall be selected to safely perform the intended operations structurally, mechanically, and electrically. They shall have been designed to conform to consensus standards, or when a consensus standard is not totally adequate, to accepted standards.	
	4.3 Special Designed Equipment	
	Special designed equipment shall be designed to safely perform the intended operations structurally, mechanically, and electrically. Standard manufactured components or commercial standard design equipment, or elements thereof, incorporated into the total system, shall meet the requirements of paras. 4.1 and 4.2, respectively, with safety factors as recommended by the manufacturer of the components and equipment.	
	4.3.1 Structural.	
	Structural design of the equipment, except as noted in (a) through (j), shall be in accordance, as applicable, with the latest accepted edition of Manual of Steel Construction of the American Institute of Steel Construction, Timber Construction Manual of the American Institute of Timber Construction, and Building Code Requirements for Reinforced Concrete (ACI 318) of the American Concrete Institute. (a) Equipment components shall be designed for the appropriate combination of vertical and horizontal loads. (b) The effects of seismic activity need not be included in combination with lifting or transporting operations during	

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	<p>construction.</p> <p>(c) Winds in excess of 50 mph (80.5 km/h) normally need not be considered in combination with lifting or transporting operations as these operations are normally suspended before winds exceed 50 mph (80.5 km/h). If available historical wind data indicate the likelihood of operations occurring during winds greater than 50 mph (80.5 km/h), such data shall be utilized as the basis of design. ANSI A58.1, Minimum Design Loads for Buildings and Other Structures, shall be used to determine the appropriate wind loads. If these forces have not been considered in design, the lifting and transporting activities shall be suspended before winds reach 50 mph (80.5 km/h).</p> <p>(d) Special designed equipment normally is designed for a limited number of operations. Fatigue factors shall be included where applicable.</p> <p>(e) Vertical impact shall be considered in the design, and selection of impact loads shall be supported by analysis. In no case shall vertical impact load be less than 10% of maximum handled load, excluding test load.</p> <p>(f) Longitudinal and transverse horizontal forces shall be determined by the maximum acceleration or deceleration which can be delivered by the complete hoisting or transporting system, the maximum grades or slide slopes encountered, maximum out-of-plumb lift, wind, and similar loads. In no case shall longitudinal or transverse horizontal forces be less than 2% of maximum handled load.</p> <p>(g) For the entire system considered as a whole, the ratio of failure stress to calculated stress shall be no less than 1.67. This minimum ratio shall exist after considering such factors as unequal load distribution, stability, slenderness ratios, and joint efficiencies.</p> <p>(h) Calculated stresses developed by handling the combination of dynamic test load and vertical impact, plus longitudinal or transverse horizontal loads, if applicable, shall not exceed 133% of allowable stresses.</p>	

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	<p>(i) Nondestructive examinations to be performed during manufacture and the acceptance criteria for these examinations shall be specified by the responsible design organization. Particular attention shall be given to lamellar tearing, highly restrained connections, and welds joining load carrying members.</p> <p>(j) Guys and gayed systems, such as column supported girders with traveling hoists, gallows, frames, gayed derricks, and similar equipment, shall be designed to provide system stability and restraint by:</p> <ol style="list-style-type: none"> (1) maintenance columns, poles, or masts in the desired position and within desired tolerances; (2) providing capability to resist forces caused by handling Operations, impact, wind, opposing guys, eccentricity, and other similar causes. <p>The design shall consider the following as a minimum:</p> <ol style="list-style-type: none"> (a) handled load (b) height of column and column capability (c) slope of the guys (d) load sharing of multiple gayed systems (e) pretension requirements (f) physical characteristics or wire rope, such as area, modulus of elasticity, and spring constant (g) footing and anchorage adequacy (h) secondary loads caused by stretch of guys (i) safety factors (j) end connections (k) Nil-ductility transition temperatures shall be considered in the design. Design criteria shall be selected by the organization responsible for the design. 	
	4.3.2 Mechanical.	
	<p>The following special conditions apply to the mechanical design.</p> <ol style="list-style-type: none"> (a) Special designed equipment normally is designed for a single operation, or for a limited number of operations. Life, 	

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	<p>durability, and fatigue factors shall be included where applicable.</p> <p>(b) Gearing shall be designed by use of American Gear Manufacturers Association formulas, or equivalent formulas, for strength only.</p> <p>(c) Each independent wire rope or chain and sprocket hoisting unit shall have at least one holding brake. At the place where the brake is applied, the minimum static torque rating shall be 150% of the torque required to hold the maximum load to be handled, excluding the test load.</p> <p>(d) Engines, gear boxes, torque converters, couplings, hydraulic jacks, pumps, valves, fittings, lines, and similar components used for hoisting operations shall be designed in conformance with the consensus standard and shall be sized to:</p> <ol style="list-style-type: none"> (1) handle load, excluding test load, within the manufacturer's rated capacity; (2) operate continuously during the specified duty cycle; (3) safely resist maximum loads imposed by emergency braking. <p>(e) Hydraulic circuit design shall take into consideration the need for design features which minimize possibilities of unexpected lowering of loads.</p> <p>(f) Engines, electric motors, brakes, gear boxes, cylinders, bearing housings, and similar components which support any part of the load shall be secured to the main structure in such a way that the entire system, including components, meets structural requirements to adequately support the load.</p> <p>(g) Rigidity of machinery base, shafts, and similar components shall be adequate to permit proper functioning of the equipment under operating conditions.</p>	
	4.3.3 Electrical.	
	<p>The following special conditions apply to the electrical design.</p> <p>(a) Electrical components and wiring used for hoisting operations shall be designed in conformance with consensus standards and shall be sized to:</p>	

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	<p>(1) lift the handled load, excluding test load, within the manufacturer's rated capacity;</p> <p>(2) operate continuously during the specified duty cycle;</p> <p>(3) be compatible with mechanical requirements for brakes in accordance with para. 4.3.2(c).</p> <p>(b) Electrical circuits shall contain provisions for proper grounding and shall incorporate design features to minimize possibilities of unexpected lowering of load.</p>	
	5 ACCEPTANCE CRITERIA FOR MANUFACTURED HANDLING EQUIPMENT	
<p>7.3 Hoisting Equipment All equipment for handling items shall be used and maintained in accordance with the following:</p> <p>7.3.1 Hoisting equipment used for handling shall be certified by the manufacturer. The certification shall indicate the various parameters for the maximum load to be handled.</p> <p>7.3.2 Hoisting equipment shall not be loaded beyond its rated load, as certified by the manufacturer, except for test purposes.</p> <p>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.</p>	<p>This Section contains the requirements for manufacture and acceptance of manufactured equipment, structures, and accessories used in the handling of nuclear power plant items.</p>	<p>There is not a one-for-one correlation of these N45.2.2 requirements to the NQA-1, Subpart 2.15 requirements. However, the requirements from N45.2.2 are all addressed, and/or expounded upon, throughout Sections 5, 6, and 7 of the NQA-1 Subpart.</p>
	5.1 Standard Manufactured Components	
	Standard manufactured components shall be manufactured and accepted in accordance with accepted industry standards.	
	5.2 Commercial Standard Design	
	Commercial standard design equipment shall be manufactured and accepted in accordance with applicable consensus standards.	
	5.3 Special Design Equipment	
	Special design equipment shall be based upon one of the following criteria.	
	5.3.1 Acceptance of existing equipment shall be based upon	

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	<p>one of the following criteria.</p> <p>(a) Historical data which show satisfactory performance in handling loads within the design capability, which are equal to or greater than the intended loads. This history would include records of tests, inspections, and maintenance performed on the equipment, along with the record of actual handling operations.</p> <p>(b) A load test in accordance with Section 6.</p> <p>(c) Recognition of capability by an engineer or other qualified materials handling individual when the equipment is handling Category C items only.</p>	
	<p>5.3.2 Acceptance criteria for new equipment and modifications to existing equipment shall conform with the following requirements.</p> <p>(a) The design shall have been performed in accordance with Section 4.</p> <p>(b) Standard manufactured components or commercial standard design equipment incorporated in the total system shall meet the requirements of para.5.1 or 5.2.</p> <p>(c) Structural steel elements shall be fabricated and erected in accordance with the latest edition of AISC S302, Code of Standard Practices for Buildings and Bridges. The following additional items shall be required.</p> <p>(1) Principal load carrying members shall be designated by the design organization responsible for either or both the design and application of the equipment. Materials of principal load carrying members shall meet any one of the following three qualifications:</p> <p>(a) record of meeting the minimum mechanical properties as documented by certified material test reports;</p> <p>(b) mechanical test report of a sample of the material showing adequate mechanical properties (this may be made by the manufacturer or a testing laboratory);</p> <p>(c) conservatism of design, documented by engineer's calculations [this option is acceptable only in emergency</p>	

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	<p>situations, where last minute changes have proved necessary by field conditions, and where options (a) and (b) above are not available].</p> <p>(2) Structural welds shall be made by qualified welders using qualified procedures in accordance with the applicable requirements of the AWS D1.1, Structural Welding Code – Steel.</p> <p>(3) Welds joining principal load carrying members shall be inspected as described in Section 6.</p> <p>(4) Structural elements of material other than steel shall be constructed in accordance with applicable consensus or accepted industry standards.</p> <p>(d) Operational tests of the entire system shall be conducted in accordance with Section 6.</p> <p>(e) Recognition of capability by an engineer or other qualified materials handling individual will suffice in lieu of (a), (c)(1), and (d) above when the equipment is handling Category C items only.</p>	
	6 TESTING, INSPECTION, AND MAINTENANCE	
	This Section defines requirements for testing, inspection, and maintenance to assure that the equipment will perform as required for the safe handling of items at nuclear facilities.	
	6.1 Testing	
	A test program shall be established to demonstrate that the handling component or equipment will perform satisfactorily in service. Testing may involve either operational or load type tests, or a combination of the two. Operational type tests cover checks of control functions and capabilities. Load type tests ensure structural and mechanical capability. Test loads shall normally be handled at the same speeds and rates of acceleration (deceleration) as planned for the intended item, except that when dynamic test loads greater than 100% are designated, the rates of acceleration (deceleration) may be adjusted downward. in addition, the following shall apply as applicable.	

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	6.1.1 Standard Manufacturing Components.	
	One of the following will satisfy the requirements for testing of these components: (a) tests as required by applicable accepted industry standards (b) actual proof load tests by the manufacturer (c) dynamic load tests as part of the system being tested to 110% of the maximum load to be handled	
	6.1.2 Commercial Standard Design Equipment.	
	One of the following will satisfy the requirements for testing of this equipment: (a) tests as required by applicable consensus standard (b) a dynamic load test equal to 110% of the maximum load to be handled	
	6.1.3 Special Designed Equipment.	
	Requirements for testing of this equipment shall be as follows. (a) An operational test shall be performed. This test shall be over the portion of the motions applicable to the handling system tested. (b) A dynamic load test equal to 110% of the maximum load to be handled by the complete system shall be performed, except that documented proof of equivalent handling ability as described in para. 5.3.1(a) may be substituted. Transport equipment tests shall demonstrate adequacy of braking, drawbar pull, stability, and other similar factors. Testing shall take place with equipment in the location where it will be used for actual handling of the item, except that in cases where the test would interfere with, or needlessly endanger an existing item or the item to be lifted, testing may be conducted at another location, on or near the construction site. Where practical and useful, load tests shall be applied over the entire range of motions required for the actual handling of the item, with the following exceptions. (1) Spreader bars, jacks, slings, or similar items whose loading is independent of travel may be tested in test fixtures at locations other than the construction site.	

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	<p>(2) Transporting vehicles need not be tested over the entire length of travel.</p> <p>During subsequent use, the testing, inspection, and maintenance shall be performed as specified by other standards.</p>	
	<p>6.1.4 Rerated Equipment.</p>	
<p>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.</p> <p>NRC Regulatory Guide 1.38, Regulatory Position C.1.b: b. Subdivision 7.3.4 of ANSI N45.2.2-1972 delineates requirements for re-rating hoisting equipment for special lifts. This subdivision requires that re-rated equipment be given a dynamic load test over the full range of the lift, using a test weight at least equal to the lift weight. In lieu of this requirement, the test weight used in temporarily re-rating hoisting equipment for special lifts in accordance with the provisions of subdivision 7.3.4 should be at least equal to 110% of the lift weight.</p> <p>Clarification from the current VA QATR: (23) With regard to Section 7.3 of ANSI N45.2.2-1972, titled Hoisting Equipment: Rerating of hoisting equipment will be considered only when absolutely necessary. Prior to performing any lift above the load rating, the equipment manufacturer must be contacted for his approval and direction. The manufacturer must be requested to supply a document</p>	<p>For special lifts, hoisting equipment may be rerated, or modified and rerated, 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.</p> <p>Rerated equipment shall be given a dynamic load test over the full range of the lift using a test weight at least equal to 110% of the lift weight. A dynamic test includes raising, lowering, and traversing the load, in contrast to a static test, in which the test weight may be increased incrementally with no movement.</p>	<p>NRC Regulatory Position is incorporated into the NQA-1 requirements.</p> <p>The level of detail in the previous QA program alternative should be contained in the implementing procedures rather than the QA Program description.</p>

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<p>granting approval for a limited number of lifts at the new rating and any restrictions involved, such as modifications to be made to the equipment, the number lifts to be made at the new rating, and the test lift load. At all times, the codes governing rerating of hoisting equipment must be observed. If rerating hoisting equipment is necessary and the Company cannot or does not contact the equipment manufacturer as described above, the test weight used in temporarily rerating hoisting equipment for special lifts will be at least equal to 110% of the lift weight. A dynamic load test over the full range of the lift using a weight at least equal to the lift weight shall be performed.</p>		
<p>7.4 Inspection of Equipment and Rigging</p> <p>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.</p> <p>7.4.1 Rigging that is frayed, worn or otherwise deteriorated shall not be used.</p> <p>7.4.2 Hoisting equipment that does not meet manufacturer's specifications shall not be used.</p> <p>7.4.3 Equipment and rigging shall be kept clean and free of contaminants that are detrimental to the material being handled.</p> <p>7.4.4 Rigging items such as hooks, shackles and turnbuckles that appear to have yielded or are distorted shall not be used.</p>	<p>6.2 Inspection</p> <p>Handling equipment in use shall be subjected to inspection. Inspections as detailed herein include three types: frequent, periodic, and major. Evidence of inspections and the results of periodic and major inspections shall be documented.</p>	<p>There is not a one-for-one correlation between the subsections of N45.2.2 to the Inspection requirements of NQA-1. However, the intent of the required inspections is met through the requirements of this subsection to NQA-1, Subpart 2.15.</p>
	<p>6.2.1 Frequent Inspections.</p>	
	<p>Frequent inspections are those performed on a day-to-day or similarly frequent basis. The inspections shall conform to the consensus standards and federal, state, and local health and safety regulations. The inspection coverage shall include parts</p>	

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	essential to safe operation plus those parts recommended by the manufacturer. A checklist shall be used to perform the inspections. These inspections shall be performed by the individual responsible for the operation of the particular equipment or by another competent individual.	
	6.2.2 Periodic Inspections.	
	Periodic inspections are those performed on a preset interval. The inspections shall conform to the consensus standards and federal, state, and local safety regulations. The inspection coverage shall include parts essential to safe operation plus those parts recommended by the manufacturer. If a system or component is not included in established codes or standards, it shall be included in a planned, scheduled inspection program developed by the organization responsible for its use and operation. Personnel qualified by experience or special training, as determined by the organization responsible for the inspection, shall perform such inspections. Results of periodic inspections shall be documented.	
	6.2.3 Major Inspections.	
	Major inspections are those performed on an as-specified basis and shall conform to a procedure prepared by the responsible organization. The procedure shall also state when the inspections are to be performed. Inspection coverage shall include recommendations of the manufacturer or designer. Visual examinations or nondestructive examinations shall be used for these inspections as deemed necessary by the designer of the component or system and by the organization responsible for its use and operation. Particular attention shall be paid to the following as applicable: (a) welds at joints between highly stressed members; (b) welds at joints in principal load carrying members and highly restrained members; (c) excessive deformation in principal load carrying members or parts; (d) adequacy of brakes under both static and dynamic	

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	<p>loadings;</p> <p>(e) response and positiveness of controls;</p> <p>(f) accuracy and response of load indicators;</p> <p>(g) overheating of power supply.</p> <p>Welds to be inspected shall be inspected in accordance with the applicable requirements of AWS D1.1, Structural Welding Code – Steel. Nondestructive examinations performed during these inspections shall be performed by an individual certified to Recommended Practice SNT-TC-1A.</p> <p>Other parts of these inspections shall be performed by personnel qualified by experience or special training, as determined by the organization responsible for the inspections. Results of major inspections shall be documented.</p>	
	6.3 Maintenance	
	<p>A maintenance program shall be established to ensure that the handling equipment is maintained in good operating condition. The program shall provide for adequate protection of equipment which is used in an environment other than the environment for which it is designed. Those responsible for operation of equipment shall be responsible for maintenance.</p>	
	6.3.1 Prerequisites.	
	<p>Equipment shall be serviced at specified intervals in accordance with the manufacturer's recommendations, severity of service, and environment. Items damaged or worn sufficiently to affect operation of equipment shall be repaired or replaced before continuing operations. Replacement parts shall meet or exceed the specifications of the part being replaced.</p>	
	6.3.2 Records.	
	<p>Maintenance shall be documented and the records kept current. These records shall show lubrication, servicing, adjustments, repairs, and replacement of the equipment.</p>	
	7 CONTROL OF THE USE OF HANDLING EQUIPMENT	
	This Section contains requirements to be fulfilled by the	

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	<p>organizations that will have operational control of the handling equipment in use at a nuclear power plant. These organizations shall appoint a person-in-charge (PIC). The PIC shall assure that procedures are provided as required; and he shall provide surveillance over the activities of personnel associated with the handling operations to ensure that the procedures are being followed, that specified quality assurance requirements are being met, and that good handling practices are being followed.</p>	
	7.1 Handling Category A Items	
	7.1.1 Prerequisites.	
	<p>Prior to the handling of a specified item and initial use of equipment, it shall have been verified that:</p> <ul style="list-style-type: none"> (a) design and manufacture of the equipment are in accordance with Sections 4 and 5; (b) the load carrying capability has been established in accordance with Section 6, and it equals or exceeds the load to be handled; (c) the equipment has been maintained in accordance with Section 6; (d) handling and moving clearances have been investigated and are satisfactory; (e) set down and installation areas have been cleared and prepared as required and are ready to receive the item. 	
	7.1.2 Procedures.	
	<p>The handling of Category A items shall be in accordance with written approved procedures, and associated instructions or drawings, as applicable. The procedures shall include the following as a minimum.</p> <ul style="list-style-type: none"> (a) Responsibilities shall be defined for organizations and key responsible individuals. Their qualifications shall be in accordance with Section 8. (b) Handling equipment to be used shall be identified, and its selection shall be on the basis of its capability to handle the load. Loads handled shall not exceed the loads used in the design of the equipment. 	

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	<p>(c) Manufacturer's instructions and conditions of operation shall be followed for the handling equipment and items to be handled.</p> <p>(d) Work instructions shall be issued for tasks which, because of their relationship to each other, must be accomplished in a certain sequence.</p> <p>(e) Where applicable, acceptance criteria shall be specified for determining when a task has been satisfactorily completed.</p> <p>(f) Inspection checkpoints shall be included when documentation by specific individuals is required as proof of satisfactory completion. Final documentation review and sign-off shall be made to verify that the operations have been performed in accordance with the procedures.</p> <p>(g) Procedures shall identify maximum safe loads which are permissible and shall describe specific methods of ensuring that these safe loads are not exceeded. Load indicating devices, properly calibrated, shall be used in systems where the primary source of power has the capability of imposing excessive loads on the equipment, component, or item being handled.</p> <p>(h) The need for soils tests shall be considered. (See Section 3 of Appendix 2.15, Subpart 3.2, Part III.)</p>	
	7.1.3 Variations.	
	<p>Variations from the procedures shall be approved and documented. Some situations may require emergency variations from the procedure. The individual with authority to act in emergencies shall have been previously identified (see para. 7.1.2). Such variations shall be documented after the fact.</p>	
	7.2 Handling Category B Items	
	7.2.1 Prerequisites.	
	<p>Prior to the actual handling of a specified item, it shall have been determined that the prerequisites of paras. 6.1 through 6.4 have been implemented. Handling and moving clearances shall have been investigated</p>	

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	7.2.2 Procedures.	
	The handling of Category B items shall be in accordance with written procedures as set forth under paras. 7.1.2(b), (c), and (d).	
	7.2.3 Variations.	
	Variations from the procedure shall be in accordance with para. 7.1.3.	
	7.3 Handling Category C Items	
	7.3.1 Prerequisites.	
	Evidence of maintenance in accordance with para. 6.3 shall be verified.	
	7.3.2 Procedures.	
	Written detailed procedures are not required. Category C items shall be handled by experienced personnel in accordance with good rigging and handling practices as described in safety handbooks, consensus standards, and corporate or contractor standards designated for the job, and in compliance with regulations. Manufacturer's load charts and general safe rigging manuals shall be available to personnel	
7.5 Personnel	8 QUALIFICATIONS OF 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.	This Section contains minimum qualifications for certain key personnel involved in assuring safe handling of nuclear power plant items. Qualifications of these personnel shall be verified by objective evidence and documented.	Similar requirement.
	8.1 Person-In-Charge (PIC)	
	The PIC of handling operations shall be designated by his management. He shall have demonstrated supervisory experience in the hoisting, rigging, and transporting activities for which he is responsible, to the satisfaction of the cognizant management.	
	8.2 Engineer	
	The engineer responsible for the design, selection, or application of special equipment, or a combination of these, shall have demonstrated capability in the technical aspects of similar work. This capability shall be achieved through	

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	education and experience. He shall be an engineering graduate of an accredited college or university, or a Professional Engineer registered to practice in an applicable discipline.	
	8.3 Inspector	
	The inspector of hoisting, rigging, and transporting equipment shall have demonstrated experience in the activity for which he is responsible. Nondestructive examiners shall meet the qualifications of Recommended Practice SNT-TC-1A	
8. RECORDS	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 as required by this standard. These records shall be placed with other project records as required by code, standard, specification or project procedures.	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. These records shall be retained with other project records as required by code, standard, specification, or project procedures.	Similar requirements.

M&TE was previously addressed in a number of ANSI standards. These are addressed below with notation of the applicable standard.	Quality Assurance Requirements for Calibration and Control of Measuring and Test Equipment Used in Nuclear Facilities NQA-1 1994 Subpart 2.16	COMMENTS
	Subpart 2.16 consists of ANSI/IEEE Std. 498-1985	
	Subpart 2.16 consists of ANSI/IEEE Std. 498-1985, IEEE Standard Requirements for the Calibration and Control of Measuring and Test Equipment Used in Nuclear Facilities.	
	The following text is from the above referenced standard. IEEE Standard Requirements for the Calibration and Control of Measuring and Test Equipment Used in Nuclear Facilities	
ANSI N18.7 § 5.2.16 Measuring and Test Equipment. ¶ 4 American National Standard N45.2.4-1972 shall be applied to those activities occurring during the operational phase that are comparable in nature and extent to related activities occurring during construction.	NQA-1-1994, Part II Applicability. Applicability for all of the Subparts (i.e., 2.x) is addressed in a general sense in the Introduction to Part II.	Requirements from ANSI N45.2.4 have been incorporated into NQA-1, Basic Requirement 12, Supplement 12S-1, and Subpart 2.16.
	1. Introduction	
	1.1 Scope.	
	This standard sets forth the requirements for a calibration program to control and verify the accuracy of measuring and test equipment used to ensure that important parts of a nuclear facility are in conformance with prescribed technical requirements and that data provided by testing, inspection, or maintenance are valid. These requirements also cover modifications and those activities occurring during the operating phase that are comparable in nature and extent to related activities occurring during the initial construction of the facility.	NQA-1 adds introductory statement that is similar to the overall introduction to the various standards that contained M&TE as a subsection of the requirements. This standard is designed to capture the information from all the previous standards into one location to avoid repetition.
	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]. During the operations phase this standard shall be used with the applicable portions of ANSI/ANS 3.2-1982	Dominion identifies in the QAPD the specific Quality Standards and editions in lieu of these standards.

<p>M&TE was previously addressed in a number of ANSI standards. These are addressed below with notation of the applicable standard.</p>	<p>Quality Assurance Requirements for Calibration and Control of Measuring and Test Equipment Used in Nuclear Facilities NQA-1 1994 Subpart 2.16</p>	<p>COMMENTS</p>
	<p>1.2 Applicability.</p>	
<p>ANSI N18.7 § 5.2.16 Measuring and Test Equipment. The method and interval of calibration for each installed instrument and control device shall be defined and shall be based on the type of equipment, stability and reliability characteristics, required accuracies and other conditions affecting calibration.</p>	<p>The requirements of this standard apply to the measuring and test equipment used during the installation, inspection, test, or maintenance activities performed at a nuclear facility. Measuring and test equipment does not include test equipment used for preliminary checks where data obtained will not be used to determine acceptability or be the basis for design or engineering evaluation.</p>	<p>The maintenance and testing activities addressed by NQA-1 would be comparable to the statement in N18.7 regarding calibration of each installed instrument and control device. Addressed in the QAPD.</p>
	<p>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.</p>	<p>Similar words to the N45 daughter standards that became the basis of this standard.</p>
	<p>The requirements of this standard are intended to be applied to measuring and test equipment used in safety systems equipment.² However, they may also be applied to measuring and test equipment used on non-safety related systems equipment.</p> <p>Footnote ² Safety systems equipment is defined in IEEE Std 603-1980.</p>	
	<p>1.3 Responsibility.</p>	
	<p>It is the responsibility of the organization invoking this standard to provide for the establishment and execution of a calibration program for the plant consistent with the provisions of this standard. 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, and such delegation shall be documented. In any case, the organization invoking this standard shall retain responsibility for overall program effectiveness.</p>	<p>New requirement.</p>

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	2. Definitions.	
	The following definitions are provided to assure a uniform understanding of selected terms as they are used in this standard.	These definitions are not contained in the current standards.
	accuracy. A measure of the degree by which the actual output of a device approximates the output of an ideal device nominally performing the same function.	
	calibration. Comparison of items of measuring and test equipment with reference standards or with items of measuring and test equipment of equal or closer tolerance to detect and quantity [quantify in context and 1990 edition] inaccuracies and to report or eliminate those inaccuracies.	Clarification, the word quantity should be replaced with quantify.
	measuring and test equipment. Devices or systems used to calibrate, measure, gage, test, inspect or control to acquire research, development, test or operational data or to determine compliance with design, specifications or other technical requirements.	
	reference standards. Standards (that is, primary, secondary and working standards, where appropriate) used in a calibration program. These standards establish the basic accuracy limits for that program.	
	tolerance. The allowable deviation from a specified or true value.	
	3. References	
	When the following standards referred to in this standard 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. [1] ANSI/ASME NQA-1-1983, Quality Assurance Program Requirements for Nuclear Facilities. [2] ANSI/ASME NQA-2-1983, Quality Assurance Requirements for Nuclear Power Plants.	The Dominion QAPD establishes the standards to be used with any approved alternatives.

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	<p>[3] ANSI/ANS 3.2-1982, Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants. [4] IEEE Std 603-1980, IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations.</p>	
	<p>4. General Requirements</p>	
<p>N45.2 ¶ 1 Measures shall be established and documented to assure that tools, gages, instruments, and other inspection, measuring, and testing equipment and devices used in activities affecting quality are of the proper range, type, and accuracy to verify conformance to established requirements.</p>	<p>A documented program shall be established, implemented and maintained for the calibration and control of measuring and test equipment and reference standards. It shall be designed to determine and assure the accuracy of measuring and test equipment and reference standards and shall provide for the prompt detection of inaccuracies and for timely and effective corrective action. This documented program shall include as a minimum the following general requirements.</p>	<p>NQA-1 adds detail.</p>
	<p>4.1 Equipment Identification.</p>	
	<p>A list of measuring and test equipment, and reference standards and their assigned locations shall be prepared to specifically identify those items within the calibration program.</p>	<p>NQA-1 adds a requirement to have a list of equipment and standards.</p>
	<p>4.2 Calibration Procedures.</p>	
<p>N45.2.4 § 2.5 Measuring and Test Equipment 2.5.1 Selection. Use shall be made of approved industry standards relating to measuring procedures.</p>	<p>Documented procedures for calibrating measuring and test equipment and reference standards shall be used. Procedures such as published standard practices, written instructions that accompany purchased equipment, or other acceptable instructions may be used. Calibration procedures shall include the following minimum basic information: (1) Identity of the item to be calibrated (2) Calibration equipment and reference standards to be used (3) Checks, tests, measurements, and acceptable tolerances (4) Sequence of operations (5) Special instructions when necessary</p>	<p>NQA-1 adds detail on procedure content.</p>

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	<p>4.3 Records.</p>	
<p>ANSI N45.2 § 13. Control of Measuring and Test Equipment N45.2 ¶ 3 Records shall be maintained and equipment suitably marked to indicate calibration status.</p>	<p>Records shall be maintained for each individual piece of equipment to show that established schedules and procedures for the calibration of measuring and test equipment and reference standards have been followed. The records shall contain a history of calibration and other means of control showing calibration interval, date of last calibration, when next calibration is due, conformance or nonconformance to required tolerances prior to and following adjustments, and any limitations on use.</p>	<p>NQA-1 adds detail on information to be included in the records.</p>
	<p>Each record shall identify the equipment to which it applies, the procedure or instruction followed in performing the calibration, the calibration data, the identity of the standard used, the identity of the person performing the calibration, and the calibration date.</p>	<p>NQA-1 adds detail on information to be included in the records.</p>
	<p>5. Elements of Control</p>	
	<p>The documented program shall include as a minimum the elements of control described in the following subsections:</p>	<p>NQA-1 adds details in Section 5 on the elements of control.</p>
	<p>5.1 Adequacy of Reference Standards.</p>	
	<p>Reference standards used for calibrating measuring and test equipment shall have calibration ranges, precisions and accuracies so that the measuring and test equipment and plant equipment can be calibrated and maintained within the required tolerances. In general, the inaccuracy of the reference standards shall contribute no more than one fourth of the allowable measuring and test equipment tolerance. However, when the actual inaccuracy of the measuring and test equipment is less than one fourth of the plant equipment tolerance, or if reference standards less than one fourth of the tolerance of the measuring and test equipment are not available, the requirement for one fourth may not be necessary. The rationale for deviating from these</p>	<p>New requirement.</p>

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	requirements shall be justified and documented.	
	5.2 Environmental Controls.	
	Measuring and test equipment and reference standards shall be transported, stored and calibrated in environments that will not adversely affect their accuracy. Environmental factors that shall be considered include, but shall not be limited to, temperature, humidity, vibration, radio-frequency interference, electromagnetic interference, background radiation, dust, cleanliness, and fumes. When inaccuracy of measuring and test equipment or reference standards, because of environmental effects, cannot be avoided, compensating corrections shall be determined and applied.	New requirement.
	5.3 Intervals of Calibration.	
<p>ANSI N45.2 § 13. Control of Measuring and Test Equipment N45.2 ¶ 2 The method and interval of calibration for each item shall be defined and shall be based on the type of equipment, stability characteristics, required accuracy, and other conditions affecting measurement control.</p>	The program shall require that measuring and test equipment and reference standards be recalled for recalibration at prescribed intervals to verify the required accuracy. Such intervals may be in calendar time or relate to usage. Interval selection should consider experience, inherent stability, purpose of use, and accuracy required. Historical records which contain sufficient experience data for evaluating and adjusting calibration intervals shall be maintained.	Similar requirement, more detail added in NQA-1
	5.4 Traceability.	
<p>N45.2 ¶ 1 To assure accuracy, inspection, measuring, and test equipment shall be controlled, calibrated, adjusted, and maintained at prescribed intervals or prior to use against certified equipment having known valid relationships to nationally recognized standards. N18.7 ¶ 2 Tools, instruments, testing equipment and measuring devices used for measurements, tests and calibration shall be of the proper range and type and shall be controlled, calibrated and adjusted and maintained at specified intervals or prior to use to assure the necessary accuracy of</p>	Measuring and test equipment shall be calibrated utilizing reference standards whose calibration has a known valid relationship to nationally recognized standards or accepted values of natural physical constants.	Similar requirements in the context of Section 5 of NQA-1, Subpart 2.16.

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<p>calibrated devices.</p> <p>ANSI N45.2.1 § 2.5 Test Equipment 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.</p> <p>N45.2.2 § 2.5 Measuring and Test Equipment. 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.</p> <p>N45.2.4 § 2.5 Measuring and Test Equipment 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. If no national standards exists, the basis for calibration shall be documented. Records of the calibrations shall be maintained and equipment suitably marked to indicate date of next required calibration. 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. Test equipment found to be out of calibration shall be clearly identified as such.</p> <p>N45.2.5 § 2.5 Measuring and Test Equipment. 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 exists.</p> <p>N45.2.8 § 2.8 Measuring and Test Equipment 2.8.2 Calibration and Control. Measuring and test equipment used to determine compliance with Specifications, shall be</p>		

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<p>adjusted and calibrated at predetermined intervals, based on equipment stability and use, against certified equipment having known valid relationships to nationally recognized standards. N45.2.13 § 7.4 Measuring and Test Equipment 7.4.2 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.</p>		
<p>N45.2 ¶ 1 If no national standards exist, the basis for calibration shall be documented. N45.2.1 § 2.5 Test Equipment 2.5.2 Calibration and Control. If no national standards exist, the basis of calibration shall be documented. N45.2.2 § 2.5 Measuring and Test Equipment. 2.5.2 Calibration and Control. If no national standards exists, the basis for calibration shall be documented. N45.2.4 § 2.5 Measuring and Test Equipment 2.5.2 Calibration and Control. If no national standards exists, the basis for calibration shall be documented. N45.2.5 § 2.5 Measuring and Test Equipment. 2.5.2 Calibration and Control. If no national standards exists, the basis for the adjustment or calibration shall be documented. Records shall be maintained and equipment suitably marked to indicate calibration status. Measures shall be taken to assure proper handling, storage and care of installation of inspection and testing equipment after calibration in order to maintain the required accuracy of such equipment. N45.2.8 § 2.8 Measuring and Test Equipment 2.8.2 If no national standards exist, the basis for calibration shall be documented. N45.2.13 § 7.4 Measuring and Test Equipment 7.4.2 Calibration and Control. If no standards exist, the basis for calibration shall be documented.</p>	<p>If no national standard exists, the basis for calibration shall be documented.</p>	<p>Similar requirement.</p>

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	<p>Reference standards used in the calibration program shall be identified on calibration data records and supported by certificates, reports, or data sheets attesting to the calibration date, calibration facility, environmental conditions, and data that shows conformance to accuracy requirements.</p>	<p>NQA-1 adds detail on record information related to reference standards used in calibration.</p>
	<p>5.5 Labeling.</p>	
	<p>Measuring and test equipment shall be labeled to indicate their control status. The label shall indicate when the next calibration is due. When size or functional characteristics of measuring and test equipment or reference standards prevent the application of a label, an identifying code shall be applied to reflect status. When neither labeling nor coding is practical, the procedures shall provide for monitoring of records to ensure control. Measuring and test equipment whose use shall be limited shall be identified and controlled; for example, a multi-scaled instrument which may be acceptable on one or more scales but limited on a specific scale or an instrument that is intended to be used for making preliminary checks.</p>	<p>New requirement.</p>
	<p>5.6 Precalibration Checks.</p>	
	<p>Measuring and test equipment and reference standards submitted for calibration shall be checked and the results recorded, before adjustments or repairs are made.</p>	<p>New requirement.</p>
	<p>5.7 Nonconformance.</p>	
<p>ANSI N18.7 § 5.2.16 Measuring and Test Equipment. ¶ 2 When calibration, testing, or other measuring devices are found to be out of calibration, an evaluation shall be made and documented concerning the validity of previous test and the acceptability of devices previously tested from the time of the previous calibration. ANSI N45.2 § 13. Control of Measuring and Test Equipment N45.2 ¶ 2 When inspection, measuring, and test equipment</p>	<p>Measuring and test equipment and reference standards found to be out of calibration or which have not been properly maintained or calibrated, or which have been subjected to possible damage, shall be identified as nonconforming and removed from service until such time as corrective measures have been taken. All equipment tested or calibrated by the item since the last calibration shall be identified and sufficient investigations performed to either re-establish the acceptability of the equipment or to confirm a nonconformance. The results</p>	<p>Similar requirement, but detail added in NQA-1.</p>

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<p>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.</p> <p>N45.2.4 § 2.5 Measuring and Test Equipment 2.5.2 Calibration and Control. 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. Test equipment found to be out of calibration shall be clearly identified as such.</p> <p>N45.2.5 § 2.5 Measuring and Test Equipment. 2.5.2 Calibration and Control. Test equipment found to be out of calibration shall be clearly identified as such. 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.</p> <p>N45.2.13 § 7.4 Measuring and Test Equipment 7.4.2 Calibration and Control. When inspection, measuring and test 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.</p>	<p>of such investigations shall be documented.</p>	
	<p>5.8 Control of Measuring and Test Equipment and Reference Standards.</p>	
	<p>Measuring and test equipment and reference standards shall be controlled to assure consistent results of acceptable accuracy. The following controls shall be considered.</p> <p>(1) Environmental and handling controls (2) Training and qualification of personnel</p>	<p>New requirement.</p>

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	<p>(3) Checking calibration status before use (4) Interim checks between calibrations (5) Documenting and recalibrating possible damaged measuring and test equipment and reference standards (6) Limiting use to authorized personnel</p>	
	<p>6. Audits</p>	
	<p>The calibrating program, in its entirety, is subject to audit in accordance with the requirements of the Quality Assurance Program.</p>	<p>NQA-1 states a requirement from 10 CFR 50, Appendix B regarding audits.</p>
	<p>7. Document Control</p>	
	<p>Equipment identification lists, procedures, calibration records, personnel qualification reports, and nonconformance reports shall be retained with other project records as required by codes, standards, specifications, or project procedures. Collection, storage and maintenance of these records shall be in accordance with the Quality Assurance Program.</p>	<p>NQA-1 adds detail to what is contained in ANSI N45.2.9 regarding records.</p>