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Comparison and Regulatory Impact of NQA-1 and NQA-2 With N45.2 QA Standards

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ABSTRACT

This report compares the 1983 edition of ANSI/ASME NQA-1 and the 1986 edition of NQA-2 standards with the ANSI N45.2 series of QA standards. NQA-1 (1983) has been endorsed for design and construction by NRC by Revision 3 of Regulatory Guide 1.28. NQA-2 has not yet been formally endorsed by the NRC. Where differences between the two sets of standards exist, the authors have assessed the impact of these differences on the regulatory process. The analysis considers both NRC Regulatory Guide endorsements and current NRC emphasis on the performance-based inspection process. The reviewers find that the NQA standards are more focused on the technical aspects of products and processes to achieve quality as compared to N45.2 standards emphasis on program verification activities. In contrast to NQA-1, NQA-2 has incorporated many lessons learned during plant construction experience and the operations phase of nuclear facilities. The summary of the impact on regulations that is presented in this report provides a comparison for utilities, vendors, and NRC inspectors of existing standards.

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Comparison and Regulatory Impact of NQA-1 and NQA-2 with N45.2 Quality Assurance Standards

I. INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) reviews national standards and, as appropriate, issues Regulatory Guides that reference the standards. In 1975, the American National Standards Institute (ANSI) engaged the American Society of Mechanical Engineers (ASME) to develop an updated set of quality assurance (QA) standards for the nuclear power industry. Since that time, two editions of NQA-1 (1983 and 1986) and one edition of NQA-2 (1986) have been published. The NRC staff has endorsed the 1983 edition of NQA-1.

In this report, the 1983 edition of NQA-1 and the 1986 edition of NQA-2 standards have been compared in detail with the ANSI N45.2 series of QA standards that is currently being used by the majority of nuclear plant licensees in the United States.* Differences between the NQA and the ANSI N45.2 series of QA standards that are significant have been identified, and the impact of these differences upon the regulatory process has been assessed.

II. BACKGROUND

Since Appendix B of 10 CFR Part 50, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," was approved and became part of the Code of Federal Regulations in June 1970, many documents have been issued to clarify specific quality requirements. Appendix B was originally issued for use during the design, procurement, and construction phases of a facility, but the 18 criteria established by Appendix B have become the backbone of all nuclear QA programs. Appendix B requirements apply directly to and place responsibility on the applicant for the establishment and execution of the total QA program.

The American National Standards Institute issued the N45.2 series of QA standards, starting with N45.2 "QA Program Requirements for Nuclear Power Plants," to set forth requirements for overall QA programs in nuclear facilities. ANSI N45.2 was to be the industry standard for QA, and it provides a basis for the development of detailed QA practices and procedures through daughter standards that provide working standards in specific areas. The daughter standards provide more detail than the paragraph or two of each criterion in Appendix B.

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* The authors of this report and Science Applications International Corporation (SAIC) gratefully acknowledge the work of the members of the NRC QA Branch who contributed to this review.

NQA-1, originally issued in the late 1970's, consolidates the N45.2 series using the format of 10 CFR 50, Appendix B. It contains the programmatic requirements embodied in N45.2 and seven of the daughter standards. This standard includes mandatory supplements and nonmandatory appendices so that it can be used to tailor the QA program for specific applications. NQA-2 incorporates the technical requirements of nine N45.2 daughter standards.

III. SCOPE AND METHODOLOGY

This report summarizes the differences of regulatory significance between NQA-1-1983 (Regulatory Guide 1.28, Revision 3) and NQA-2-1986 and the ANSI N45.2 series. The differences were identified by first comparing each requirement of the ANSI N45.2 series against the comparable requirement in the NQA standards. The differences noted in the comparison were assessed to determine their regulatory impact. For each comparison, the regulatory impact is stated in generic terms to avoid making assumptions regarding individual licensee approaches to fulfilling standard's requirements. In general, the standards analysis reflects the NRC's emphasis on performance-based inspection techniques. The assessment also considers the potential impact of changes to the plant operations phase, recognizing that the NRC position for operating plant QA programs is guided by ANSI N18.7/ANS 3.2 and the ANSI N45.2 series as endorsed by Regulatory Guide 1.33.

Individual analyses for each of the ANSI N45.2 series QA standards are attached. NQA-2 parts 2.15 (Hoisting, Rigging, etc.) and 2.20 (Subsurface Investigation) were not reviewed because there are no comparable NRC-endorsed ANSI standards. Part 2.4 (Installation, Inspection and Testing, Instrumentation and Electrical Equipment) is in the process of preparation and cannot at this time be compared to IEEE 336-1971 (ANSI N45.2.4-1972) or successor standard ANSI/IEEE 336-1985. The individual analyses identify specific differences of regulatory significance for each N45.2 requirement and also provide an overall assessment of the impact of differences between that specific N45.2 standard and the corresponding NQA-1 or NQA-2 section.

IV. SUMMARY

Table 1 has been prepared to show an overview of comparable sections of NQA-1 and ANSI N45.2 relative to the legal requirements specified in 10 CFR 50, Appendix B. The table also highlights structural differences. For example, N45.2.8 subsections shown in the bracket are typical of all the N45.2 series, which are essentially stand-alone documents for specific quality requirements.

In contrast, the NQA-1 and NQA-2 documents have general statements in the introduction sections that are amplified in supplements and appendices in NQA-1 and in specific sub-chapter headings in NQA-2. The NQA-1 and NQA-2 standards are more integrated and require the user to incorporate the amplified material as appropriate.

Table 1

COMPARABLE STRUCTURE OF QA STANDARDS RELATIVE TO 10CFR50, APP. B

10CFR50, App. B		ANSI N45.2 Series (2)	(3)	NQA-1 Basic Req'ts (4)	NQA-1 Mandatory Supplements	NQA-1 Non-Mand. App. (5)	ANS 3.2 (6)
I	Organization			1	1S-1*	1A-1	3
II	QA Program	N45.2		2	*	2A-1	5
III	Design	2.11		3	3S-1	3A-1	
IV	Proc. Doc.			4	4S-1	4A-1	
V	Instr., Pro., Dwg.			5			
VI	Doc. Control			6	6S-1		
VII	Purchasing	2.13	1. Introduction	7	7S-1	7A-1	
VIII	Identification		1.1 Scope	8	8S-1		
IX	Special Processes (1)	2.1, 2.2, 2.3, 2.5, 2.20	1.2 Applicability	9	9S-1		
X	Inspection	*, 2.6	1.3 Responsibility	10	10S-1*	2A-1	5
XI	Testing	2.8 ----------	1.4 Definitions	11	11S-1		
XII	M&TE		1.5 Ref. Doc	12	12S-1		
XIII	Handling	2.15	2. General Req'ts	13	13S-1		
XIV	Status	*	2.1 Planning	14	*		
XV	Nonconformances	*	2.2 Procedures	15	15S-1		
XVI	Corrective Action	*	2.3 Results	16	*		4
XVII	Records	2.9	2.9 Prerequisites	17	17S-1	17A-1	
XVIII	Audits	2.12, 2.23		18	18S-1	18A-1, 2A-3	4
		2.10 (Definitions)			S-1		

NOTES:

1 NQA-2 expands upon seven special processes.

2 Asterisks signify important topics, not further expanded upon in ANSI N45.2 QA series and NQA standards, that are open to various interpretations in licensee procedures.

3 These sections of N45.2.8 are typical of N45.2 series, whereas NQA-1 covers only Purpose, Applicability, Responsibility, and Definitions to avoid repetition, but sometimes diminishes pertinence.

4 Repeats, and sometimes restates, regulations in 10CFR50, App. B.

5 Expository wording of ANSI N45.2 QA series properly reduced to nonmandatory guidance; other provisions rephrase actual requirements, which could lead to conflicting interpretations.

6 ANS 3.2 gives additional requirements for these important topics in operations.

In summarizing the differences between both bodies of QA standards, the reviewers find the NQA standards have updated and improved the technical definition of product and processes on "how to achieve quality," and have incorporated lessons learned regarding plant construction activities, equipment installation and maintenance. This is particularly true for the NQA-2 standard. At the same time, the NQA-1 standard, published initially in 1979 before the NRC study of QA effectiveness (NUREG-1055), generally does not recognize industry growth, improved methods for integrating QA into management activities, and other initiatives that stress performance effectiveness. It has, instead, provided less prescriptive provisions for QA monitoring, verifying, data trending, corrective action, and communications with management, recognizing that when accent on the quality of performed activities accomplishes needed quality results, verification actions can be diminished.

V. CONCLUSIONS

The individual section-by-section analyses are summarized in Appendix 1 and Appendix 2. The major differences are specified and then categorized as to whether or not the regulatory impact is either more or less prescriptive for an effective QA process. In the cases where we determined it to be more prescriptive, we note if it encourages more licensee emphasis on (a) fulfilling QA responsibility; (b) performing function effectively; or (c) providing tangible evidence of accomplishment. In the cases where it is determined to be less prescriptive, we note if it allows licensee deemphasis on (a) fulfilling the QA principles broadly stated by regulations; (b) applying QA provisions consistently; or (c) performing QA functions effectively. In some cases the impact was less prescriptive, but practical, in which case we note if it permits licensee to (a) satisfy the broadly stated "generic" requirement, or (b) give more attention to "substance," i.e., effective performance. In some cases the impact of the difference was to clarify the specification and therefore contributed to more consistent understanding by the licensees.

The general conclusions, stated in bold face type at the end of each analysis, are summarized below.

General Conclusions Resulting from the Comparison of NQA-1-1983 with ANSI N45.2 QA Standards

QA PROGRAM REQUIREMENTS (N45.2): NQA-1 changes deemphasize programmatic and quality verification activities (that is, provisions on how to oversee, positively influence, and control quality), while retaining and improving the technical provisions of how to achieve quality.

INSPECTION PERSONNEL QUALIFICATIONS (N45.2.6): NQA-1 changes simplify and strengthen slightly the requirements for inspector qualifications. The key provision for assessment of an inspector's qualification based upon review of his performance has been maintained.

QUALITY ASSURANCE RECORDS (N45.2.9): The principal change was the deletion of the list of record types and retention times. Regulatory Guide 1.28, Revision 3 addresses this area. Safety System Functional Inspection reports and the operational plant lessons learned and published in NRC NUREGs such as NUREG 1154 give good insight into the need for ready availability of records for reference by: 1) operations personnel to maintain operational boundaries within the design bases, and 2) maintenance personnel to maintain plant configuration compatible with design bases.

DEFINITIONS (N45.2.10): There are minor changes in Supplement S-1 of NQA-1 compared to ANSI N45.2.10 and Regulatory Guide 1.74, but the pattern to the changes is consistent. The technical matter is improved and updated; the QA process and its interaction with design and engineering activities are deemphasized.

DESIGN CONTROL (N45.2.11): NQA-1 consolidates design control requirements, improves the structure, and provides several updated concepts that reflect the intervening years of operating plant experience since publication of the 1974 standard.

QUALITY ASSURANCE AUDITS (N45.2.12): NQA-1 changes tend to minimize the importance of audits and to reduce the organizational status of the auditing organization. NQA-1 does not emphasize the performance aspect of the auditing function. ANSI N18.7/ANSI 3.2 covers items not specified in either NQA-1 or ANSI N45.2 standards, such as review of the QA program adequacy by executive management, availability of technical expertise to auditors, QA internal and external overview functions, and preventive actions such as data analysis of problem area patterns.

CONTROL OF PURCHASED ITEMS (N45.2.13): NQA-1 maintains the essence of procurement control but does delete some of the procurement control requirements and reduces others to non-mandatory guidance. This might permit a lessening of effective performance in maintaining quality of purchased items and services.

AUDIT PERSONNEL QUALIFICATION (N45.2.23): NQA-1 changes in Supplement 2S-3 are positive, even though they are few and minor in nature. The changes are consistent with the emphasis on effective performance rather than perfunctory compliance with forms, artificial rating systems, and schedules.

General Conclusions Resulting from the Comparison of NQA-2-1986 with ANSI N45.2 QA Standards

CLEANNESS (N45.2.1): NQA-2 changes consist of more definitive requirements and clarification of application to modifications, repairs, maintenance, and other facets of the operations phase. The objective is cleanness of systems, with appropriate controls on the cleaning reagents and operations themselves. The requirements are based upon the expectation that licensee QA organizations will review maintenance, modification, repair, and operations procedures and practices in advance of their use (as in process

qualification) to predetermine that contamination, machine chips, escaped lubrication, or hydraulic fluid from various machining operations have been considered prior to the operation and that proper preventive measures have been taken to maintain clean systems.

PACKAGING, SHIPPING, STORAGE (N45.2.2): NQA-2 changes deemphasize the inspection and verification provisions specified in N45.2.2 and Regulatory Guide 1.38 (Rev. 2) that apply directly to item packaging and storing. There are some minor technical improvements on the specific packaging steps. The deemphasis could lead to problems in incorrect marking or use of nonacceptable items unless the licensee recognizes the obligation to inspect packaging and storage based upon other QA program requirements and commitments.

STRUCTURES: SOILS, FOUNDATIONS, STEEL, CONCRETE (N45.2.5): NQA-2 changes are positive, primarily due to updated and more comprehensive technical requirements, with inspection verification requirements relatively unchanged.

INSTALLATION, INSPECTION, AND TESTING OF MECHANICAL EQUIPMENT (N45.2.8): NQA-2 changes are positive, clarifying ASME Boiler and Pressure Vessel Code (B&PV) interaction and applicability to the operations phase, although these were already covered by Regulatory Guides. Essentially, there is little change and thus little regulatory impact.

VI. REFERENCES

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6. Requirements for Auditing of Quality Assurance Programs for Nuclear Power Plants, ANSI/ASME N45.2.12, 1977.

7. Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants, ANSI/ASME N45.2.13, 1976.

8. Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants, ANSI/ASME N45.2.23, 1978.

9. Cleaning of Fluid Systems and Associated Components During Construction Phase of Nuclear Power Plants, ANSI/ASME N45.2.1, 1973.

10. Packaging, Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants (During the Construction Phase), ANSI/ASME N45.2.2, 1972.

11. Housekeeping During the Construction Phase of Nuclear Power Plants, ANSI/ASME N45.2.3, 1973.

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20. USNRC Regulatory Guide 1.39, Housekeeping Requirements for Water-Cooled Nuclear Power Plants, Revision 2, 1977.

21. USNRC Regulatory Guide 1.28, Quality Assurance Program Requirements (Design and Construction), Revision 2, 1979, and Revision 3, 1985.

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26. USNRC Regulatory Guide 1.38, Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants, Revision 2, 1977.

27. USNRC Regulatory Guide 1.58, Qualification of Nuclear Power Plant Inspection, Examination, and Testing Personnel, Revision 1, 1980.

28. USNRC Regulatory Guide 1.64, Quality Assurance Requirements for the Design of Nuclear Power Plants, Revision 2, 1976.

29. USNRC Regulatory Guide 1.74, Quality Assurance Terms and Definitions, 1974.

30. USNRC Regulatory Guide 1.88, Collection, Storage, and Maintenance of Nuclear Power Plant Quality Assurance Records, Revision 2, 1976.

31. USNRC Regulatory Guide 1.116, Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems, Revision O-R, 1976.

32. USNRC Regulatory Guide 1.123, Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants, Revision 1, 1977.

33. USNRC Regulatory Guide 1.144, Auditing of Quality Assurance Programs for Nuclear Power Plants, Revision 1, 1980.

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APPENDIX 1

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2 QA STANDARDS

QUALITY ASSURANCE PROGRAM REQUIREMENTS

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2

ANSI N45.2 (1977) Section/Title	NQA-1 (1983)	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2
1.2 Applicability	I (Introduction) I-2	NQA-1 requires that the extent of application be defined in the QA program; gives option for the invoking organization to define. N45.2 wording gives considerations for defining.	Less prescriptive, but practical; NQA-1 permits licensee to: a. satisfy the broadly stated "generic" requirement b. give more attention to "substance," i.e., effective performance
1.2 Applicability	—	NQA-1 does not exclude applicability to ASME B&PV Code activities.	To the extent that NQA-1 refers to the ASME B&PV code, NQA-1 is more prescriptive; encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
1.3 Responsibility	—	Contractor's obligation to meet licensee QA program overtly stated in N45.2, whereas the same position has to be derived from NQA-1 wording.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. applying QA provisions consistently b. performing QA functions effectively
2 Quality Assurance Program	II-2	NQA-1 wording of the requirement for management review of the status and adequacy of the QA program shifts the concept to self-review by QA management.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively

QUALITY ASSURANCE PROGRAM REQUIREMENTS

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2

ANSI N45.2 (1977) Section/Title	NQA-1 (1983)	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2
3 Organization	—	NQA-1 deletes the requirement for QA to report regularly to top management on the effectiveness of the program.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively
4.2 Interface Control	3S-1, 6	NQA-1 specifies that there shall be documentation of design information transmitted between organizations.	More prescriptive for an effective QA process; NQA-1 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment
4.3 Design Verification	3S-1, 4	NQA-1 defines allowable design verification by supervisors.	Less prescriptive, but practical; NQA-1 permits licensee to: a. satisfy the broadly stated "generic" requirement b. give more attention to "substance," i.e., effective performance
7 Document Control	6S-1	NQA-1 does not have an equivalent requirement for a procedure on document control that specifically shows valid issues and dated distribution lists to user activities.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. applying QA provisions consistently
9 Identification and Control of Materials, Parts and Components	8S-1, 3	NQA-1 recognizes post-installation need for control of limited-life items and identification controls of stored items.	More prescriptive for an effective QA process; NQA-1 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment

QUALITY ASSURANCE PROGRAM REQUIREMENTS

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2

ANSI N45.2 (1977) Section/Title	NQA-1 (1983)	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2
10 Control of Special Processes	9S-1	NQA-1 changes wording throughout this section, which shifts emphasis from requirements for special processes in codes and standards (or at equivalent levels) to "specified requirements" in licensee procedures.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. applying QA provisions consistently b. performing QA functions effectively
11 Inspection	10S-1	N45.2 specifies that inspection shall be done by or for the organization performing an activity. NQA-1 diminishes this requirement to an unspecified basis of "where necessary."	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively
		NQA-1 does not spell out who can consent to work proceeding at a hold point. Further, NQA-1 introduces a new word and concept to "waive" a hold point.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently
12 Test Control	11S-1	NQA-1 omits specification of a test program and diminishes requirements for preparing a test procedure by allowing alternates such as drawings, or supplier manuals. Also, NQA-1 is not clear about test requirements being satisfied, introducing wording on "deviations noted" and "actions taken" without defining who is authorized to take the action.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively

QUALITY ASSURANCE PROGRAM REQUIREMENTS

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2

ANSI N45.2 (1977) Section/Title	NQA-1 (1983)	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2
13 Control of Measuring and Test Equipment	12S-1	NQA-1 adds the requirement to tag and/or segregate out-of-calibration devices.	More prescriptive for an effective QA process; NQA-1 encourages more licensee emphasis on: a. providing tangible evidence of accomplishment
15 Inspection, Test, and Operating Status	II 14	NQA-1 incorporates the words "where it is necessary" to modify the entire requirement. [Note that 10CFR50 App. B used the words "where necessary" only to identify items which have passed certain inspections.] In effect, N45.2 required status of acceptance to be clear on all items, but NQA-1 does not.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently
16 Nonconforming Items	4.3, 4.4	NQA-1 deletes the requirement to define responsibility and authority for disposition of nonconformances.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. applying QA provisions consistently
17 Corrective Action	II 16	NQA-1 adds a direction on how to preclude recurrence by specifying that follow-up shall be made to verify corrective action implementation.	More prescriptive for an effective QA process; NQA-1 encourages more licensee emphasis on: a. providing tangible evidence of accomplishment
17 Corrective Action	II 16	NQA-1 deletes the requirement for the licensee's documented commitment, "the measures shall be established," and deemphasizes the basis for problem-preventive activities such as data trending, analysis of events at other plants, etc.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively

QUALITY ASSURANCE PROGRAM REQUIREMENTS

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2

ANSI N45.2 (1977) Section/Title	NQA-1 (1983)	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2
18 Quality Assurance Records	17S-1	NQA-1 shifts from a description of types of records to be obtained to definition of the underlying reasons for selecting records to be obtained. The reasons are valid and also comprehensive, but will require the licensee and his contractors to make interpretations and translations.	Less prescriptive, but practical; NQA-1 permits licensee to: a. satisfy the broadly stated "generic" requirement b. give more attention to "substance," i.e., effective performance
18 Quality Assurance Records	17S-1	NQA-1 accepts signifying acceptability of items and activities alone, whereas N45.2 requires records of both inspection and test results and indication of acceptability.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. applying QA provisions consistently
18 Quality Assurance Records	17S-1	NQA-1 implies, via the criteria for record retention, but does not clearly state, that the as-built conditions shall be maintained in the records.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently
18 Quality Assurance Records	17S-1	NQA-1 defines storage conditions both generically and in full, specific detail.	More prescriptive for an effective QA process; NQA-1 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment

QA PROGRAM REQUIREMENTS (N45.2): NQA-1 changes deemphasize programmatic and quality verification activities (that is, provisions on how to oversee, positively influence, and control quality), while retaining and improving the technical provisions of how to achieve quality.

INSPECTION PERSONNEL QUALIFICATION

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2.6

ANSI N45.2.6 (1978) Section/Title	NQA-1 (1983) 2S-1, 2S-2, 2S-4	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2.6
1.2 Applicability	—	NQA-1 does not exclude B&PV Code inspectors.	To the extent that NQA-1 refers to the ASME B&PV Code, NQA-1 is more prescriptive; encourages more licensee emphasis on: a. fulfilling QA responsibility
2.2 Determination of Initial Capability	2S-1, 2.5	NQA-1 specifies that either test results or capability demonstration is required (in addition to education, experience, training) for initial qualification. Change is consistent with Reg. Guide 1.58, Rev. 1, 9/80.	More prescriptive for an effective QA process; NQA-1 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively
2.5 Physical	2S-1, 2.8	NQA-1 requires licensee to define period of reverification of physical characteristics.	Less prescriptive, but practical; NQA-1 permits licensee to: a. satisfy the broadly stated "generic" requirement
3 Qualifications	2A-1	NQA-1 does not require three levels of qualifications. Regulatory Guide 1.28, Rev. 3 reinstates the requirement.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. applying QA provisions consistently

INSPECTION PERSONNEL QUALIFICATIONS (N45.2.6): NQA-1 changes simplify and strengthen slightly the requirements for inspector qualifications. The key provision for assessment of an inspector's qualification based upon review of his performance has been maintained.

QUALITY ASSURANCE RECORDS

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2.9

ANSI N45.2.9 (1974) Section/Title	NQA-1 (1983) 17S-1	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2.9
1.2 Applicability	—	N45.2.9 excludes ASME B&PV Section III and XI activity records; NQA-1 covers all QA records.	To the extent that NQA-1 refers to ASME B&PV Code, NQA-1 is more prescriptive; encourages more licensee emphasis on: a. performing function effectively
3.2.2 Index	—	NQA-1 omits the detailed requirement for a records index.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. applying QA provisions consistently
3.2.7 Retention of Records	17S-1, 2.8	NQA-1 provides a listing of types of records as non-mandatory guidance. Reg. Guide 1.28, Rev. 3, 8/85, Section C.2, provides very definitive records retention requirements.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently

QUALITY ASSURANCE RECORDS

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2.9

ANSI N45.2.9 (1974) Section/Title	NQA-1 (1983) 17S-1	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2.9
5.6 Facility	17S-1, 4.4	The NQA-1 facility descriptions, although less restrictive in terms of fire rating, are updated, detailed and more definitive.	Less prescriptive, but practical; NQA-1 permits licensee to: a. satisfy the broadly stated "generic" requirement b. give more attention to "substance," i.e., effective performance
—	17S-1, 6	NQA-1 prescribes conditions to be met prior to disposal of non-permanent records.	More prescriptive for an effective QA process; NQA-1 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment

QUALITY ASSURANCE RECORDS (N45.2.9): The principal change was the deletion of the list of record types and retention times. Regulatory Guide 1.28, Revision 3 addresses this area. Safety System Functional Inspection reports and the operational plant lessons learned and published in NRC NUREGs such as NUREG 1154 give good insight into the need for ready availability of records for reference by: 1) operations personnel to maintain operational boundaries within the design bases, and 2) maintenance personnel to maintain plant configuration compatible with design bases.

DEFINITIONS

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2.10

ANSI N45.2.10 (1973) Section/Title	NQA-1 (1983) S-1	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2.10
Terms and Definitions	Terms and Definitions		
As-built data	—	Definition omitted from NQA-1, with a lessening of the position that as-built data is actual data, such as inspection measurements, contrasted to a statement that the "item is within drawing tolerances." The latter gives a range of measurements or conditions, not the specific actual conditions achieved by manufacture.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently
Certification	Certification	NQA-1 extends the definition to cover processes and procedures, and provides a more definitive basis for licensee to provide objective statements in documents that processes and procedures have been demonstrated as adequate.	More prescriptive for an effective QA process; NQA-1 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
—	Corrective Action	New NQA-1 definition narrows the scope of the corrective action concept to cover those actions that occur <u>after</u> discovery of the deficiency.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
—	Design input, Output process, Final design	New NQA-1 definitions	More prescriptive for an effective QA process; NQA-1 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment

DEFINITIONS

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2.10

ANSI N45.2.10 (1973) Section/Title	NQA-1 (1983) S-1	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2.10
Terms and Definitions	Terms and Definitions		
Repair	Repair	NQA-1 redefinition states that the repaired item does not conform to original requirements. This change minimizes the prior understanding that repairs could be made to meet original requirements. More importantly, repairs frequently involve more extensive fabrication processes than rework and require special reinspection to ascertain that original design bases are fulfilled.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively
Rework	Rework	NQA-1 redefinition deletes the examples (remachining, reassembling). The effect of this change minimizes the prior understanding that rework did not deviate from standard operations (so that the standard inspections would be effective in ascertaining the quality of the reworked item).	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively
—	Special Process	New NQA-1 definition	More prescriptive for an effective QA process; NQA-1 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment

DEFINITIONS

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2.10

ANSI N45.2.10 (1973) Section/Title	NQA-1 (1983) S-1	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2.10
Terms and Definitions	Terms and Definitions		
Use-as-is	Use-as-is	NQA-1 diminishes the basis for Use-as-is disposition to "satisfactory."	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently
—	Waiver	NQA-1 introduces the new definition and the concept of waiving requirements (without controls on basis for authority.) Note the contrast with ASME B&PV Code position which does not sanction departure from requirements.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently

DEFINITIONS (N45.2.10): There are minor changes in Supplement S-1 of NQA-1 compared to ANSI N45.2.10 and Regulatory Guide 1.74, but the pattern to the changes is consistent. The technical matter is improved and updated; the QA process and its interaction with design and engineering activities are deemphasized.

DESIGN CONTROL

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2.11

ANSI N45.2.11 (1974) Section/Title	NQA-1 (1983) 3S-1	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2.11
1.2 Applicability	—	NQA-1 does not exclude ASME B&PV Section III and XI activity design.	To the extent that NQA-1 refers to the ASME B&PV Code, NQA-1 is more prescriptive; encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment
1.2, 1.3 Applicability, Responsibility	—	NQA-1 does not restate the "extent of applicability" for QA program controls in Section 3S-1; those of Sections I and II-2 apply.	Less prescriptive, but practical; NQA-1 permits licensee to: a. satisfy the broadly stated "generic" requirement
—	3S-1, 3	NQA-1 addresses designer's upgrading of commercial grade assemblies, requiring traceable documentation.	More prescriptive for an effective QA process; NQA-1 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment
—	3S-1, 3.1	NQA-1 addresses in adequate detail the proper utilization of computer programs in design process.	More prescriptive for an effective QA process; NQA-1 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
2.2 Program Procedures	—	NQA-1 does not give examples of the scope and extent of design control procedures.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. applying QA provisions consistently b. performing QA functions effectively

DESIGN CONTROL

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2.11

ANSI N45.2.11 (1974) Section/Title	NQA-1 (1983) 3S-1	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2.11
3.2 Requirements	3A-1, 5	Design input requirements are appropriately expanded by four new items in NQA-1, but then reduced to non-mandatory guidance.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently
—	3S-1, 4	NQA-1 specifies that design verification shall occur prior to use of the item.	More prescriptive for an effective QA process; NQA-1 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
—	3S-1, 4.2.3	NQA-1 clarifies that testing shall be specific for each design feature.	More prescriptive for an effective QA process; NQA-1 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
5 Interface Control	3S-1, 6	NQA-1 does not require status of design input information (including incomplete items) to be identified.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively
6.2 Extent	3S-1, 4.1	NQA-1 extends requirements for design verification of design changes to the design bases.	More prescriptive for an effective QA process; NQA-1 encourages more licensee emphasis on: a. performing function effectively

DESIGN CONTROL

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2.11

ANSI N45.2.11 (1974) Section/Title	NQA-1 (1983) 3S-1	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2.11
6.3.1 Design Reviews	3S-1, 4.2.1	NQA-1 shortens the design review checklist.	Less prescriptive, but practical; NQA-1 permits licensee to: a. satisfy the broadly stated "generic" requirement b. give more attention to "substance," i.e., effective performance
6.3.3 Qualification Testing	3S-1, 4.2.3	NQA-1 omits some of the planning and procedural steps for qualification testing that were included in N45.2.11.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently
—	3S-1, 7	NQA-1 specifies that documents identify the source of design inputs.	More prescriptive for an effective QA process; NQA-1 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment

DESIGN CONTROL (N45.2.11): NQA-1 consolidates design control requirements, improves the structure, and provides several updated concepts that reflect the intervening years of operating plant experience since publication of the 1974 standard.

QUALITY ASSURANCE AUDITS

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2.12

ANSI N45.2.12 (1977) Section/Title	NQA-1 (1983) 18S-1	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2.12
3.2 Objectives	18A-1, 2.1	The objectives of audits in N45.2.12 are removed in NQA-1 and reduced to non-mandatory guidance.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently
3.3.4	18A-1, 2.2	Access to facilities, documents, and personnel reduced to non-mandatory guidance in NQA-1.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively
3.3.6	18A-1, 2.2	NQA-1 reduces the provision for access to management level with responsibility and authority to take corrective action to non-mandatory guidance.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively
3.5.3.5	18A-1, 2.4	Audit schedule to include a systematic, independent assessment of an activity when considered necessary. This requirement of N45.2.12 reduced to non-mandatory guidance in NQA-1.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently

QUALITY ASSURANCE AUDITS

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2.12

ANSI N45.2.12 (1977) Section/Title	NQA-1 (1983) 18S-1	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2.12
4.3.2.4	18S-1	NQA-1 does not clearly state the requirement for analysis of root cause of deficiencies, does not clearly state the need to determine the extent of deficiencies.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively
4.4.6	18S-1	NQA-1 is silent regarding auditor's recommendations for correcting program deficiencies. (A recommendation by the auditor not only provides a perspective from an independent source to the activity, but often assists in characterizing the deficiency in inescapable terms.)	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively
4.4.6	18A-1,5	Audit report issuance within 30 days reduced to nonmandatory guidance in NQA-1.	Less prescriptive, but practical; NQA-1 permits licensee to: a. satisfy the broadly stated "generic" requirement b. give more attention to "substance," i.e., effective performance

QUALITY ASSURANCE AUDITS (N45.2.12): NQA-1 changes tend to minimize the importance of audits and to reduce the organizational status of the auditing organization. NQA-1 does not emphasize the performance aspect of the auditing function. ANSI N18.7/ANSI 3.2 covers items not specified in either NQA-1 or ANSI N45.2 standards, such as review of the QA program adequacy by executive management, availability of technical expertise to auditors, QA internal and external overview functions, and preventive actions such as data analysis of problem area patterns.

CONTROL OF PURCHASED ITEMS

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2.13

ANSI N45.2.13 (1976) Section/Title	NQA-1 (1983) 7S-1, 4S-1	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2.13
1.1 Scope	I-1 (7S-1)	NQA-1, unlike N45.2.13, directly recognizes operating plant phase procurement, and provides specifics on replacement parts. Regulatory Guide 1.123, Rev. 1, 7/77, invoked ANSI N18.7 (1976) as a partial remedy to this shortfall.	More prescriptive for an effective QA process; NQA-1 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
1.1 Scope	(7S-1)	N45.2.13 was not applicable to ASME B&PV Code, Sections III and XI procured items. Regulatory Guide 1.123, Rev. 1 made N45.2.13 requirements applicable to ASME B&PV Code procured items and services. [Note: The NRC Regulatory Guide 1.123 action may have been the forerunner to the NQA standards; the N45.2.13 "guidance" appendix also may have been the source of the concept of NQA non-mandatory appendices.]	More prescriptive for an effective QA process; NQA-1 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively
—	4S-1, 2.7	NQA-1 adds the requirement for identification of replacement parts in the procurement document.	More prescriptive for an effective QA process; NQA-1 encourages more licensee emphasis on: a. performing function effectively
3.2.4 Right of Access	7S-1, 5	Specific requirements on witness and hold point basis in procurement documents in N45.2.13 are reduced to non-mandatory guidance in NQA-1. NQA-1 added general wording in section 5 (f) as a basis for inspection.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. applying QA provisions consistently b. performing QA functions effectively

CONTROL OF PURCHASED ITEMS

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2.13

ANSI N45.2.13 (1976) Section/Title	NQA-1 (1983) 7S-1, 4S-1	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2.13
3.3 Procurement Document Review	7S-1, 2	N45.2.13 specifies review of procurement documents prior to their issuance to suppliers. NQA-1 requires "integration of actions."	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively
7.2.1 Source Verification Planning	7S-1, 8.2.2	NQA-1 deletes the inclusion of acceptance criteria for source verification.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively
7.2.2 Receiving Inspection Planning	7S-1, 8.2.3	N45.2.13 specifies that the receiving inspection plan identify characteristics to be verified. NQA-1 gives examples of characteristics to verify at receiving inspection. [These examples are generally appropriate; however, note that there is no direct mention of material used.] Regulatory Guide 1.123, Rev. 1 reinforces N45.2.13 and requires that the receiving inspection have access to procurement documents.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively

CONTROL OF PURCHASED ITEMS

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2.13

ANSI N45.2.13 (1976) Section/Title	NQA-1 (1983) 7S-1, 4S-1	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2.13
7.3.2 Receiving Inspection	7S-1, 8.2.3	N45.2.13 specifies that receiving inspection shall include review of technical documents given as evidence of meeting requirements. NQA-1 adds: "when procurement documents require such documents prior to receiving inspection."	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively
10.3.1 Acceptance by Source Verification	7A-1, 4.1	The basis for source verification is reduced to non-mandatory guidance in NQA-1.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively
10.3.2 Acceptance by Receiving Inspection	7A-1, 4.2 (7S-1)	The basis for receiving inspection is reduced to non-mandatory guidance. Note that Regulatory Guide 1.123, Rev. 1 had reinforced this requirement by insisting on the word "shall."	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively
10.3.3 Acceptance by Supplier Certificate of Conformance	7A-1, 4.3 (7S-1)	The basis for defining the utilization of certificates of nonconformance is reduced to non-mandatory guidance in NQA-1.	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively

CONTROL OF PURCHASED ITEMS

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2.13

ANSI N45.2.13 (1976) Section/Title	NQA-1 (1983) 7S-1, 4S-1	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2.13
10.3.4 Acceptance by Post Installation Test at the Nuclear Power Plant Site	7A-1, 4.4 (7S-1)	The basis for defining proper usage of post-installation testing is reduced to non-mandatory guidance in NQA-1. Regulatory Guide 1.123, Rev. 1 had reinforced this requirement by insisting on the word "shall." Note that post-installation testing is one effective method for determining suitability for use, especially for "functionality."	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively

CONTROL OF PURCHASED ITEMS (N45.2.13): NQA-1 maintains the essence of procurement control but does delete some of the procurement control requirements and reduces others to non-mandatory guidance. This might permit a lessening of effective performance in maintaining quality of purchased items and services.

AUDIT PERSONNEL QUALIFICATION

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2.23

ANSI N45.2.23 Section/Title	NQA-1 (1983) 2S-3	DIFFERENCE	REGULATORY IMPACT OF NQA-1 RELATIVE TO ANSI N45.2.23
2.3 Qualification of Lead Auditors	(2S-3)	N45.2.23 specifies a ten credit scoring system, whereas NQA-1 cites only the essential requirements as mandatory.	Less prescriptive, but practical; NQA-1 permits licensee to: a. satisfy the broadly stated "generic" requirement b. give more attention to "substance," i.e., effective performance

AUDIT PERSONNEL QUALIFICATION (N45.2.23): NQA-1 changes in Supplement 2S-3 are positive, even though they are few and minor in nature. The changes are consistent with the emphasis on effective performance rather than perfunctory compliance with forms, artificial rating systems, and schedules.

APPENDIX 2

COMPARISON OF NQA-2 (1986) WITH ANSI N45.2 QA STANDARDS

CLEANNESS

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2.1

ANSI N45.2.1 (1973) Section/Title	NQA-2 (1986) PART 2.1	DIFFERENCE	REGULATORY IMPACT OF NQA-2 RELATIVE TO ANSI N45.2.1
1.2 Applicability	1	NQA-2 specifies application for repairs and modifications, and thus for operations phase activites.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
2.1 Planning	2.1	NQA-2 added item (h), plan to avoid hazards.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively
2.1 Planning	2.2.2	NQA-2 adds requirements to evaluate effects of residual contaminants.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively
2.2 Procedures and Instructions	2.2.2	NQA-2 converts guidance on items in work procedures to requirement.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
2.2 Procedures and Instructions	2.2.2(g)	NQA-2 adds requirement for monitoring of velocities.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment

CLEANNESS

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2.1

ANSI N45.2.1 (1973) Section/Title	NQA-2 (1986) PART 2.1	DIFFERENCE	REGULATORY IMPACT OF NQA-2 RELATIVE TO ANSI N45.2.1
3.1 Cleanness Classifications	3.2.1	NQA-2 specifies Class A cleanness requirements; includes installation.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment
3.1.1, 3.1.2, 3.1.3, 3.1.4 Class A, B, C, D	3.2.1, 3.2.2, 3.2.3, 3.2.4	Both N45.2.1 and NQA-2 give the fundamental basis for assigning cleanness classifications. N45.2.1 provides examples of systems with cleanness requirements corresponding to cleanness levels.	Less prescriptive, but practical; NQA-2 permits licensee to: a. satisfy the broadly stated "generic" requirement b. give more attention to "substance," i.e., effective performance
—	3.3	NQA-2 has added a requirement for specifying cleanness classification and criteria for hydraulic lines and systems. Levels are non-mandatory.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment
—	3.4.2	Consideration of requirements for use of inert gas blanket added in NQA-2.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment
—	3.4.3	Consideration of requirements for use of organic fluids added in NQA-2.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2.1

ANSI N45.2.1 (1973) Section/Title	NQA-2 (1986) PART 2.1	DIFFERENCE	REGULATORY IMPACT OF NQA-2 RELATIVE TO ANSI N45.2.1
—	3.4.4	NQA-2 has added requirements for fluids used on hydraulic, instrument control, and lubrication systems.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment
—	3.4.5	NQA-2 adds requirements to control use of acid cleaning.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment
—	3.4.6	NQA-2 adds precautions on use of contaminated tools.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment
—	4	NQA-2 has added the requirement for cleanness controls during manufacture (including requirements that they be specified in procurement documents).	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
5 Installation Cleaning	6	NQA-2 embodies essentially the same provisions, stated with the word "shall," and giving more definition on cleaning methods.	Clarified specification; NQA-2 contributes to more consistent understanding by licensee.

COMPARISON OF NQA-1 (1983) WITH ANSI N45.2.1

ANSI N45.2.1 (1973) Section/Title	NQA-2 (1986) PART 2.1	DIFFERENCE	REGULATORY IMPACT OF NQA-2 RELATIVE TO ANSI N45.2.1
6 Maintenance	7	NQA-2 further defines sealing-off limited access areas, particularly applicable to maintenance, modification, and repair steps where clean systems are entered for work.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
—	10	NQA-2 makes clear the cleanness requirement applicability in the plant operations phase.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment

CLEANNESS (N45.2.1): NQA-2 changes consist of more definitive requirements and clarification of application to modifications, repairs, maintenance, and other facets of the operations phase. The objective is cleanness of systems, with appropriate controls on the cleaning reagents and operations themselves. The requirements are based upon the expectation that licensee QA organizations will review maintenance, modification, repair, and operations procedures and practices in advance of their use (as in process qualification) to predetermine that contamination, machine chips, escaped lubrication, or hydraulic fluid from various machining operations have been considered prior to the operation and that proper preventive measures have been taken to maintain clean systems.

PACKAGING, SHIPPING, STORAGE

COMPARISON OF NQA-2 (1986) WITH ANSI N45.2.2

ANSI N45.2.2 (1972) Section/Title	NQA-2 (1986) PART 2.2	DIFFERENCE	REGULATORY IMPACT OF NQA-2 RELATIVE TO ANSI N45.2.2
2.7.1, 2.7.2, 2.7.3, 2.7.4 Classification Level A, B, C, D	2.2.1, 2.2.2, 2.2.3, 2.2.4	NQA-2 uses the term "accelerating" forces in place of "gravitational" forces.	Clarified specification; NQA-2 contributes to more consistent understanding by licensee.
2.7.2 Level B	2.2.2	NQA-2 reduces storage level for welding electrodes which are hermetically sealed.	Less prescriptive, but practical; NQA-2 permits licensee to: a. satisfy the broadly stated "generic" requirement b. give more attention to "substance," i.e., effective performance
3.2.1, 3.2.2 Levels of Packaging Level A, B	3.2.1, 3.2.2	Whereas N45.2.2 required all level A and level B items to be packaged with a barrier and in containers or crates, NQA-2 applies these requirements to items "which require protection."	Less prescriptive for an effective QA process; NQA-2 allows licensee to deemphasize: a. applying QA provisions consistently
3.2.2 Level B	3.2.2	NQA-2 adds requirements for purchaser review of transfer procedures.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
3.2.3 Level C	3.2.3	NQA-2 relaxes requirements for use of containers or crates to items "which require protection."	Less prescriptive for an effective QA process; NQA-2 allows licensee to deemphasize: a. applying QA provisions consistently

PACKAGING, SHIPPING, STORAGE

COMPARISON OF NQA-2 (1986) WITH ANSI N45.2.2

ANSI N45.2.2 (1972) Section/Title	NQA-2 (1986) PART 2.2	DIFFERENCE	REGULATORY IMPACT OF NQA-2 RELATIVE TO ANSI N45.2.2
3.5.2 Caps, Plugs, Tapes, and Adhesives	3.5.2	NQA-2 makes stronger the prohibition against adhesives in contact with base metal surfaces by use of the word "shall." Further, NQA-2 allows the continued use of tape in operation phase, where "qualified."	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively
3.6.3 and A3.6.3 Desiccants	3.6.3	N45.2.2 provided a numerical limit for halogen content in the dessicant material used with austenitic stainless steel. NQA-2 has no exact numerical value; adds other contaminants besides halogens which shall not be present in harmful quantities that are leachable. NQA-2 also includes nickel alloys.	Less prescriptive, but practical; NQA-2 permits licensee to: a. satisfy the broadly stated "generic" requirement
3.9 Marking	3.9	NQA-2 has added a sentence which allows use of records identifiable to items in lieu of direct tagging/ marking.	Less prescriptive for an effective QA process; NQA-2 allows licensee to deemphasize: a. applying QA provisions consistently b. performing QA functions effectively
4.2.3 Special Shipments	4.2.3	NQA-2 upgrades requirement for use of accelerometers.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment

PACKAGING, SHIPPING, STORAGE

COMPARISON OF NQA-2 (1986) WITH ANSI N45.2.2

ANSI N45.2.2 (1972) Section/Title	NQA-2 (1986) PART 2.2	DIFFERENCE	REGULATORY IMPACT OF NQA-2 RELATIVE TO ANSI N45.2.2
4.5.2, 4.5.3 Inspection at Point of Shipment, Entry	4.5.2, 4.5.3	NQA-2 extends inspection requirement to all shipments.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
5.4 Status Indicating System	5.4	NQA-2 eliminates the requirement for clear acceptance status identification of received items.	Less prescriptive for an effective QA process; NQA-2 allows licensee to deemphasize: a. fulfilling the QA principles broadly stated by regulations b. applying QA provisions consistently c. performing QA functions effectively
5.6 Marking	5.5	NQA-2 has dropped the requirement for verification of marking.	Less prescriptive for an effective QA process; NQA-2 allows licensee to deemphasize: a. performing QA functions effectively
—	6.3.6	NQA-2 added a requirement for positioning of items to avoid water entrapment.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively

COMPARISON OF NQA-2 (1986) WITH ANSI N45.2.2

ANSI N45.2.2 (1972) Section/Title	NQA-2 (1986) PART 2.2	DIFFERENCE	REGULATORY IMPACT OF NQA-2 RELATIVE TO ANSI N45.2.2
7.3.4 Hoisting Equipment	7.3.4	NQA-2 increased the weight for test lifts to 110%, matching the requirement applied via Regulatory Guide 1.38, Rev. 2.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively

PACKAGING, SHIPPING, STORAGE (N45.2.2): NQA-2 changes deemphasize the inspection and verification provisions specified in N45.2.2 and Regulatory Guide 1.38 (Rev. 2) that apply directly to item packaging and storing. There are some minor technical improvements on the specific packaging steps. The deemphasis could lead to problems in incorrect marking or use of nonacceptable items unless the licensee recognizes the obligation to inspect packaging and storage based upon other QA program requirements and commitments.

STRUCTURES: SOILS, FOUNDATIONS, STEEL, CONCRETE

COMPARISON OF NQA-2 (1986) WITH ANSI N45.2.5

ANSI N45.2.5 (1974) Section/Title	NQA-2 (1986) PART 2.5	DIFFERENCE	REGULATORY IMPACT OF NQA-2 RELATIVE TO ANSI N45.2.5
1.1 Scope	Introduction to Part 2, 1 Purpose	NQA-2 extends applicability to maintenance, modifications, repair, and testing, and thus into the plant operations phase. (Note that ANSI N45.2.5 was referenced in ANSI N18.7.)	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
1.1 Scope	1, 2	NQA-2 has added requirements for soils and foundations.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
2.4 Personnel Qualifications	—	NQA-2 did not carry forward the provision for level III qualification of inspection manager.	Less prescriptive, but practical; NQA-2 permits licensee to: a. satisfy the broadly stated "generic" requirement b. give more attention to "substance," i.e., effective performance
3.2.1 Qualification Tests	5.2	NQA-2 permits use of "current documentary test data" in lieu of qualification tests of material.	Clarified specification; NQA-2 contributes to more consistent understanding by licensee.
3.2.1 (Table A) Required Qualification Tests	5.2 (Table 5.2)	The NQA-2 table extends to cover additional materials.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment

STRUCTURES: SOILS, FOUNDATIONS, STEEL, CONCRETE

COMPARISON OF NQA-2 (1986) WITH ANSI N45.2.5

ANSI N45.2.5 (1974) Section/Title	NQA-2 (1986) PART 2.5	DIFFERENCE	REGULATORY IMPACT OF NQA-2 RELATIVE TO ANSI N45.2.5
—	6,7	The entire NQA-2 sections on soils, earthwork, and foundation underpinning are additions to N45.2.5 requirements.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
4.1 Concrete Construction Inspection	8.1	NQA-2 has added requirement for inspection of pre-or-post tensioning systems.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
4.2 Protection of Materials	8.2(e)	NQA-2 has added materials to be inspected.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
4.3.1 Measuring, Mixing Equipment	8.3.1	NQA-2 has added a requirement for inspection of method of adding water in mixing operations.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment

STRUCTURES: SOILS, FOUNDATIONS, STEEL, CONCRETE

COMPARISON OF NQA-2 (1986) WITH ANSI N45.2.5

ANSI N45.2.5 (1974) Section/Title	NQA-2 (1986) PART 2.5	DIFFERENCE	REGULATORY IMPACT OF NQA-2 RELATIVE TO ANSI N45.2.5
4.4 Preplacement Preparations	8.4	NQA-2 has added detailed requirements specific to concrete placement preparations beyond those of N45.2.5.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
4.5 Concrete Placement	8.5	NQA-2 has made minor additions to controls on concrete placement. [Note: There is no added emphasis on concrete consolidating and licensee QA verification that could be expected as a result of lessons learned in the 1970 era of plant construction. However, the NRC inspector has ample regulatory basis on which to expect licensee QA to inspect, verify, and document results of adequate concrete placement.]	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
4.7 Curing	8.7	NQA-2 has added controls on concrete test cylinders.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment
—	8.8, 8.9, 8.10	NQA has added these entire sections.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment

COMPARISON OF NQA-2 (1986) WITH ANSI N45.2.5

ANSI N45.2.5 (1974) Section/Title	NQA-2 (1986) PART 2.5	DIFFERENCE	REGULATORY IMPACT OF NQA-2 RELATIVE TO ANSI N45.2.5
4.8 In-Process Tests	8.11	NQA-2 replaces the detailed test frequencies and referenced ASTM test method of N45.2.5 Table B with the references to ASME B&PV Code Section III, Division 2 and ACI Standard 359. Also, NQA-2 adds controls on sampling of concrete.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment
4.9 Cadweld Splice Testing	8.12	NQA replaces the detailed qualification of operators, inspection, and testing provisions in N45.2.5 with references to ASME B&PV Code Section III, Division 2 and ACI Standard 359.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment
4.10 Welded Re-bar Splices	8.13	NQA-2 replaces the referenced standard, AWS D12-1, with reference to ASME B&PV Code Section III, Division 2 and ACI Standard 359.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment
5.4 High Strength Bolts	9.4.1	NQA-2 changes bolt length acceptance criteria from two threads protruding to ends of bolt flush with or outside face of nut.	Less prescriptive, but practical; NQA-2 permits licensee to: a. satisfy the broadly stated "generic" requirement b. give more attention to "substance," i.e., effective performance
5.5 Welding	9.5	NQA-2 adds requirement that in-process inspection of welding note acceptability of environmental conditions.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment

COMPARISON OF NQA-2 (1986) WITH ANSI N45.2.5

ANSI N45.2.5 (1974) Section/Title	NQA-2 (1986) PART 2.5	DIFFERENCE	REGULATORY IMPACT OF NQA-2 RELATIVE TO ANSI N45.2.5
6.2 Protection of Materials	10.2.3	NQA-2 adds retesting provisions for aggregate tests.	Less prescriptive, but practical; NQA-2 permits licensee to: a. satisfy the broadly stated "generic" requirement b. give more attention to "substance," i.e., effective performance
—	10.4	NQA-2 provides a basis for QA controls and inspection on soil compaction.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment

STRUCTURES: SOILS, FOUNDATIONS, STEEL, CONCRETE (N45.2.5): NQA-2 changes are positive, primarily due to updated and more comprehensive technical requirements, with inspection verification requirements relatively unchanged.

INSTALLATION, INSPECTION, AND TESTING OF MECHANICAL EQUIPMENT

COMPARISON OF NQA-2 (1986) WITH ANSI N45.2.8

ANSI N45.2.8 (1975) Section/Title	NQA-2 (1986) PART 2.8 NQA-1 (1983) 11S-1	DIFFERENCE	REGULATORY IMPACT OF NQA-2 RELATIVE TO ANSI N45.2.8
1.1 Scope	—	NQA-2 removes any limitations of applicability to ASME B&PV items. This is consistent with Regulatory Guide 1.116, 6/76.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
1.1, 1.2 Scope, Applicability	—	NQA-2 wording removes the construction phase boundary and makes the standard requirements fully applicable to plant operations phase. This is consistent with Regulatory Guide 1.116, 6/76 and also Regulatory Guide 1.68, Rev. 2, 8/78.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. fulfilling QA responsibility b. performing function effectively c. providing tangible evidence of accomplishment
2.2 Procedures, Instructions	NQA-1 11S-1, 3	NQA-1 provides alternates to use of test procedures with caution to "include adequate instructions to assure required quality of work."	Less prescriptive for an effective QA process; NQA-1 allows licensee to deemphasize: a. applying QA provisions consistently b. performing QA functions effectively
2.3 Results	NQA-2, PART 2.8, 6	NQA-2 requires analysis and reporting of test results, but requirements are stated generally, not detailed and specific as in N45.2.8.	Less prescriptive, but practical; NQA-2 permits licensee to: a. satisfy the broadly stated "generic" requirement b. give more attention to "substance," i.e., effective performance

INSTALLATION, INSPECTION, AND TESTING OF MECHANICAL EQUIPMENT

COMPARISON OF NQA-2 (1986) WITH ANSI N45.2.8

ANSI N45.2.8 (1975) Section/Title	NQA-2 (1986) PART 2.8 NQA-1 (1983) 11S-1	DIFFERENCE	REGULATORY IMPACT OF NQA-2 RELATIVE TO ANSI N45.2.8
4.5.2 Pressure Testing	NQA-2, PART 2.8, 4.4.2(h)	NQA-2 adds requirement for evidence of calibration of test gages.	More prescriptive for an effective QA process; NQA-2 encourages more licensee emphasis on: a. performing function effectively b. providing tangible evidence of accomplishment

INSTALLATION, INSPECTION, AND TESTING OF MECHANICAL EQUIPMENT (N45.2.8): NQA-2 changes are positive, clarifying ASME Boiler and Pressure Vessel Code (B&PV) interaction and applicability to the operations phase, although these were already covered by Regulatory Guides. Essentially, there is little change and thus little regulatory impact.