FORM NG-1, REV 2

1

DUKE POWER COMPANY
NUCLEAR GUIDE

Page 1 of 10
Effective Date 1/6/83

Nuclear Guide 1.143
Revision 1a

2

Title: Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants

3

Reference NRC Regulatory Guide Number 1.143 Revision 1

4

Plants Affected	Disposition * of This RG Revision	Current Disposition of Revision Number	Previous RG Revisions Disposition
☒ Oconee	Partial Compliance	1	Partial Compliance
☒ McGuire	Partial Compliance	1	Partial Compliance
☒ Catawba	Partial Compliance	1	Partial Compliance
☒ Cherokee	Partial Compliance	1	Partial Compliance

☐ _____ *Note: This guide provides interim guidance for all radioactive waste management systems, structures, and components installed after 6-1-81.

*Disposition is either "Adopted, "Adopted with comment", "Partial Compliance", "Not Applicable", or "Under Review". If "Partial Compliance" is indicated, attach Form NG-1A.

5

Originated By:
Name R E Miller
Dept Design Engineering
Date 10-6-82

Coordination With:
A R Brown
Design Engineering
10-6-82

6

Reviewed By:
S K Blackley Jr.
Design Engineering
10-7-82.

7

Approval Action:

☐ Waived
☒ Approved
M M Miller
Construction
10/12/82
Date

☐ Waived
☒ Approved
P C Daik
Design Engineering
10-7-82
Date

☐ Waived
☒ Approved
T G Campbell
Nuclear Production
11/11/82
Date

☐ Waived
☒ Approved
M J Morris
Quality Assurance
10/6/82
Date

8302250424 830218
PDR ADOCK 05000269
P PDR

FORM NG-1A REV 0

1		
DUKE POWER COMPANY NUCLEAR GUIDE	Page 2 of 10	Nuclear Guide 1.143 Revision 1a

2

Summary of Alternatives taken to Regulatory Guide

Detailed clarification is provided to enhance implementation of the Guide. As low as reasonably achievable (ALARA) is Duke's criteria for evaluating effectiveness of activities associated with Duke Class E systems.

3

Alternatives (Rewrite the affected Regulatory Guide Section below. Continue on additional sheets as necessary. Position statements should directly correspond to the affected Reg Guide section or be a continuation of the Reg Guide format.)

Refer to pages 3-10 of Nuclear Guide for rewritten sections of Regulatory Guide

4

Justification (Must be sufficiently detailed to permit evaluation by Department heads and NRC)

All exceptions taken to NR[illegible]ry Guide 1.143 are to:

1) Provide additional fl[illegible].n design approach to achieve same objective, o[illegible]

2) Exclude design scope more properly performed outside jurisdiction of the NRC Regulatory Guide, or

3) Provide additional detail and direction on how Regulatory Guide intent will be accomplished, or

4) Exclude structures housing radwaste systems from OBE seismic requirements above a height sufficient to contain the maximum liquid inventory expected to be in the building, or

5) Exclude Duke's QA Program condition 2 requirements for those radwaste structures, systems or components that have no ALARA significance.

DUKE POWER COMPANY

NUCLEAR GUIDE 1.143, REVISION

A. INTRODUCTION

See Regulatory Guide 1.143

B. DISCUSSION

Duke Nuclear Guide 1.26 describes system design classifications used to differentiate functional, component and Quality Assurance requirements.

Fluid systems that contain or may contain radioactive materials in solid, liquid or gaseous form may be identified with one of three categories. Safety related systems are those whose postulated failure would result in conservatively calculated offsite doses comparable to the values presented in 10 CFR 100. Safety related fluid systems are always classified as A, B or C. Duke Class E systems are those whose postulated failure would result in conservatively calculated offsite doses less than the limits of 10 CFR 20. In this context, Duke Class E and Radwaste systems are interchangeable terms. Systems that contain or may contain radioactive material whose postulated failure would result in conservatively calculated offsite doses of a trivial nature are excluded from both safety related and radwaste considerations. Examples of this latter class are the steam generator blowdown system, secondary systems in general (condensate/feedwater exclusive of safety related boundary) floor drains, equipment vents beyond valves and auxiliary building HVAC systems exclusive of Spent Fuel Pool HVAC systems. A trivial dose is small compared to the design guides of 10 CFR 50 Appendix I.

Duke Nuclear Guide 1.143 addresses Duke Class E systems as described above exclusively.

Regulatory Guide 1.143 Section B is adopted subject to the following clarification and discussion.

This Nuclear Guide 1.143 consists of NRC Regulatory Guide 1.143 partially rewritten to reflect additional existing recognized guides and criteria which adequately define design requirements for radioactive waste management systems.

C. REGULATORY POSITION

C.1 Systems Handling Radioactive Materials in Liquids

C.1.1 The liquid radwaste treatment system should meet the following criteria:

C.1.1.1 See Regulatory Guide 1.143

C.1.1.2 Materials for pressure-retaining components should conform to the requirements of the specification as shown in Table 1 except that

malleable, wrought, or cast iron materials and plastic pipe should not be used. Exception to these material restrictions may be allowed on selected components when other than steel material is justified by documented and approved engineering evaluations. Materials should be compatible with the chemical, physical, and radioactive environment of specific applications during normal conditions and anticipated operation occurrences.

C.1.1.3 See Regulatory Guide 1.143

C.1.1.4 See Regulatory Guide 1.143

C.1.2 All tanks located outside reactor containment and containing radioactive materials in liquids should be designed to prevent uncontrolled releases of radioactive materials due to spillage in buildings or from outdoor tanks. The following design features should be included for tanks that may contain radioactive materials:

C.1.2.1 All tanks inside and outside the plant should have provisions to monitor liquid levels. Potential overflow conditions should actuate alarms such that proper action can be taken.

C.1.2.2 All tank overflows, drains, and sample lines should be routed to the liquid radwaste treatment system.[4]

C.1.2.3 Areas containing indoor tanks should have floor drains routed to the liquid radwaste treatment system.[4]

C.1.2.4 See Regulatory Guide 1.143

C.1.2.5 See Regulatory Guide 1.143

C.2 Gaseous Radwaste Systems

C.2.1 Gaseous Radwaste Systems classified Duke System Class C are described in Duke Nuclear Guide 1.26. The following paragraphs apply to Duke Class E systems containing radioactive gases.

C.2.1.1 See Regulatory Guide 1.143

C.2.1.2 See Regulatory Guide 1.143

C.2.1.3 See Regulatory Guide 1.143

C.3 Solid Radwaste System

C.3.1 Duke Class E solid radwaste systems consist of slurry waste collections and settling tanks, spent resin storage tanks, phase separators, and components and subsystems used to solidify, compact, incinerate or otherwise reduce the volume of radwastes prior to offsite shipment. The solid radwaste handling and treatment system should meet the following criteria:

C.3.1.1 See Regulatory Guide 1.143

C.3.1.2 Materials for pressure-retaining components should conform to the requirements of specifications as shown in Table 1, except that malleable, wrought, or cast iron materials and plastic pipe should not be used. Exception to these material restrictions may be allowed on selected components when other than steel material is justified by documented and approved engineering evaluations. Materials should be compatible with the chemical, physical, and radioactive environment of specific applications during normal conditions and anticipated occurrences.

C.3.1.3 See Regulatory Guide 1.143

C.3.1.4 See Regulatory Guide 1.143

C.4 Additional Design, Construction, and Testing Criteria

C.4.1 See Regulatory Guide 1.143

C.4.2 See C.6 of this Nuclear Guide

C.4.3 Pressure-retaining components of process systems should use welded construction to the maximum practicable extent. Process systems include the first root valve on sample and instrument lines. Flanged joints or suitable rapid-disconnect fitting should be used only where maintenance or operational requirements clearly indicate that such construction is preferable. Process lines should not be less than 3/4 inch (nominal). Socket weld joints should be used on lines 3/4 inches or larger but less than 2 1/2 inches, except for instrumentation and components furnished with screwed connections. For lines 2 1/2 inches and above, pipe welds should be of the butt-joint type. Nonconsumable backing rings should not be used in lines carrying resins or other particulate material. All welding constituting the pressure boundary of pressure-retaining components should be performed in accordance with ASME Boiler and Pressure Vessel Code Section IX.

C.4.4 Piping systems should be hydrostatically tested in their entirety during the Construction phase except for atmospheric connections where no isolation valves exist.

Pressure testing should be performed on as large a portion of the inplace systems as practicable. Testing of piping systems during the Operation phase should be performed in accordance with applicable ASME or ANSI codes.

C.4.5 See Regulatory Guide 1.143

C.5 Seismic Design for Structures Housing Radwaste Management Systems Below a Height Sufficient to Contain the Maximum Liquid Inventory Expected to be in the Structure.

C.5.1 See Regulatory Guide 1.143

C.5.1.1 See Regulatory Guide 1.143
C.5.1.2 See Regulatory Guide 1.143
C.5.1.3 See Regulatory Guide 1.143

C.5.2 See Regulatory Guide 1.143

C.5.2.1 Same as Regulatory Guide 1.143 with the following addition:

These criteria apply to that portion of the structure described in Section C Regulatory Position, subsection 1.1.3 only. In addition, the seismically designed portion of the building structure should include elimination of potential pathways for leakage should a radioactive spill occur by 1) providing curb walls around areas for potential spills that can contain the liquid inventory, 2) provide a positive means to prevent leakage from all construction joints located below the spill level, and 3) installing leak tight seals over expansion joints located below the spill level.

All other structural portions shall be designed to the same criteria as conventional power plants and treatment facilities with the addition of specific ALARA design features.

The design will assure that the 1 in 100 year wind load, and the 1 in 100 year flood (both precipitation and river basin flooding are to be considered) are properly accounted to preclude structural failure from these events and allow the facility to remain operable.

C.5.2.2 See Regulatory Guide 1.143
C.5.2.3 See Regulatory Guide 1.143
C.5.2.4 See Regulatory Guide 1.143
C.5.2.5 See Regulatory Guide 1.143
C.5.2.6 See Regulatory Guide 1.143

C.5.3 See Regulatory Guide 1.143

C.6 Quality Assurance for Radwaste Management Systems

Since the impact of these systems on safety is limited, the extent of control required by Appendix B to 10 CFR Part 50 is similarly limited. To ensure that systems will perform their intended function, a quality assurance program sufficient to ensure that all design, construction, and testing provisions are met should be established and documented.

Quality assurance for radwaste management systems conforms to Duke Power Company's quality assurance program for QA Condition 2 (Radwaste/Class E). A correlation between NRC quality groups, ANS safety classes, and Duke system classifications is presented in Table 2 of Duke Nuclear Guide 1.26. Duke's quality assurance program for Duke QA Condition 2 adequately meets the QA requirements of ANSI N 199-1976/ANS-55.2 as reprinted in Regulatory Guide 1.143.

General application of Duke's Quality Assurance Program to design/procurement and construction activities for QA Condition 2 is summarized

in Tables 3 and 4 respectively of Duke Nuclear Guide 1.26 which document Duke's policy on the applicability of quality assurance to these activities. Specific details on the degree or extent of quality assurance applied and implementation dates therof are defined in Duke's Quality Assurance Program.

As Duke's QA Program for QA Condition 2 is limited, performance of quality related functions may be performed by any one or a combination of Design Engineering, Construction, Steam Production, Quality Assurance Departments and by satisfactorily meeting the requirements of Duke procedures for ANSI B31.1.0 Power Piping Systems.

Specific application of Duke's Quality Assurance Program to design procurement and construction activities is limited to those items which are ALARA related; those items whose failure or loss of function are not judged to be radiologically significant are specifically excluded from QA Condition 2 but do require conventional quality standards of performance as described in appropriate Duke Power Co. procedures and specs. A partial list of included and excluded items is provided as Table 2 of this Guide.

Equipment Codes and Standards for Duke QA Condition 2 is described in Table 1 of this Nuclear Guide.

Sufficient records are maintained to furnish evidence that Duke's Quality Assurance Program is being properly implemented during QA procedures as described in appropriate construction procedures but will as a minimum include:

1. Inprocess work will be randomly inspected visually and items of nonconformance will be documented.

2. A final verification of system functional configuration will be documented.

D. IMPLEMENTATION

See Regulatory Guide 1.143

REFERENCES

See Regulatory Guide 1.143

TABLE 1

EQUIPMENT CODES FOR DUKE SYSTEM PIPING CLASSIFICATION E (ALL STATIONS)

EQUIPMENT	CODES			
	Design and Fabrication	Materials[1]	Welder Qualification and Procedures	Inspection and Testing
Pressure Vessels	ASME Code Section VIII, Div. 1	ASME Code Section II	ASME Code Section IX	ASME Code Section VIII, Div. 1
Atmospheric Tanks	ASME Code[3] Section III, Class 3, or API 650, or AWWA D-100[2], or ASME Code Section VIII, Div. 1[5]	ASME Code[2] Section II	ASME Code Section IX	ASME Code[3] Section III, Class 3, or API 650, or AWWA D-100[2], or ASME Code Section VIII, Div. 1
0-15 PSIG Tanks	ASME Code[3] Section III, Class 3, or API 620[2], or ASME Code Section VIII, Div 1[5]	ASME Code[2] Section II	ASME Code Section IX	ASME Code[3] Section III, Class 3, or API 620[2], or ASME Code Section VIII, Div. 1
Heat Exchangers	ASME Code Section VIII, Div. 1 and TEMA	ASME Code Section II	ASME Code Section IX	ASME Code Section VIII, Div. 1
Piping and Valves	ANSI B31.1	ASTM or ASME Code Section II	ASME Code Section IX (as required)	ANSI B31.1
Pumps	Manufacturers'[4] Standards	ASME Code Section II or Manufacturers' Standards	ASME Code Section IX (as required)	ASME Code[3] Section III, Class 3 or Hydraulic Institute Standards

Notes:

1 Material certification only as required of manufacturer for ASME Code Section VIII stamped components.

2 Fiberglass reinforced plastic tanks may be used in accordance with appropriate articles of Section 10, ASME Boiler and Pressure Vessel Code, for applications at ambient temperature.

3 ASME Code stamp, material traceability, and the quality assurance criteria of Appendix B to 10 CFR Part 50 are not required. Therefore, these components are not classified as ASME Code Class 3.

4 Manufacturer's standard for the intended service. Hydrotesting should be 1.5 times the design pressure.

5 ASME Code stamp, material traceability, and the quality assurance criteria of Appendix B to 10 CFR Part 50 are not required. Therefore, these components are not classified as ASME Code Section VIII.

TABLE 2

APPLICABILITY OF DUKE QUALITY ASSURANCE PROGRAM QA CONDITION 2

APPLIES TO ALARA RELATED FUNCTIONS AS PRESCRIBED IN REGULATORY GUIDE 1.143*	DOES NOT APPLY
RADWASTE PROCESS SYSTEM DESIGN FUNCTIONS	SPECIFIC NON-ALARA ITEMS SUCH AS VALVE OPERATORS, PUMP MOTORS, AND READILY REPLACEABLE ITEMS
ASSOCIATED RADWASTE PROCESS SYSTEM FABRICATION & CONSTRUCTION ACTIVITIES	
ASSOCIATED RADWASTE PROCESS SYSTEM PROCUREMENT ACTIVITIES	LIQUID RADWASTE BUILDINGS
EFFLUENT CONTROL FEATURE DESIGN FUNCTIONS	RADWASTE PROCESS SYSTEM COMPONENTS BEYOND FLUID PRESSURE BOUNDARY, THAT IS, SUPPORTS/RESTRAINTS INSTRUMENTATION AND CONTROLS, ETC.
ASSOCIATED EFFLUENT CONTROL FEATURE FABRICATION AND CONSTRUCTION ACTIVITIES	
ASSOCIATED EFFLUENT CONTROL FEATURE PROCUREMENT ACTIVITIES	
STRUCTURAL ALARA DESIGN FEATURES & AS-BUILT COMPLIANCE	
STRUCTURAL SEISMIC DESIGN FEATURES	

*ALARA related functions are those important to meet individual station Technical specification design objectives.

Footnote Page

[1]See Regulatory Guide 1.143

[2]See Regulatory Guide 1.143

[3]See Regulatory Guide 1.143

[4]See Regulatory Guide 1.143

[5]See Regulatory Guide 1.143

[6]See Regulatory Guide 1.143

[7]See Regulatory Guide 1.143

[8]See Regulatory Guide 1.143

[9]See Regulatory Guide 1.143

U.S. NUCLEAR REGULATORY COMMISSION

Revision 1
October 1979

REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

REGULATORY GUIDE 1.143

DESIGN GUIDANCE FOR RADIOACTIVE WASTE MANAGEMENT SYSTEMS, STRUCTURES, AND COMPONENTS INSTALLED IN LIGHT-WATER-COOLED NUCLEAR POWER PLANTS

A. INTRODUCTION

Paragraph (a) of § 50.34, "Contents of applications; technical information," of 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," requires that each application for a construction permit include a preliminary safety analysis report. Part of the information required is related to quality assurance and the preliminary design of the facility, including, among other things, the principal design criteria for the facility. Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50 establishes overall quality assurance requirements for structures, systems, and components important to safety. Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 establishes minimum requirements for the principal design criteria for light-water-cooled nuclear power plants.

Criterion 1, "Quality Standards and Records," of Appendix A requires that structures, systems, and components important to safety be designed, fabricated, erected, and tested to quality standards commensurate with the importance to safety of the safety function to be performed and that a quality assurance program be established and implemented in order to provide adequate assurance that these structures, systems, and components will satisfactorily perform their safety function. Criterion 2, "Design Bases for Protection Against Natural Phenomena," of Appendix A requires, among other things, that structures, systems, and components important to safety be designed to withstand the effects of natural phenomena such as earthquakes without loss of capability to perform their safety functions and that the design bases for these structures, systems, and components reflect the importance of the safety functions to be performed. Criterion 60, "Control of Releases of Radioactive Materials to the Environment," of Appendix A requires that the nuclear power unit design include means to control suitably the release of radioactive materials in gaseous and liquid effluents and to handle radioactive solid waste produced during normal reactor operation, including anticipated operational occurrences.

This guide furnishes design guidance acceptable to the NRC staff relating to seismic and quality group classification and quality assurance provisions for radioactive waste management systems, structures, and components. Further, it describes provisions for controlling releases of liquids containing radioactive materials, e.g., spills or tank overflows, from all plant systems outside reactor containment. The Advisory Committee on Reactor Safeguards has been consulted concerning this guide and has concurred in the regulatory position.

B. DISCUSSION

One aspect of nuclear power plant operation is the control and management of liquid, gaseous, and solid radioactive waste[1] (radwaste) generated as a byproduct of nuclear power. The purpose of this guide is to provide information and criteria that will provide reasonable assurance that components and structures used in the radioactive waste management and steam generator blowdown systems are designed, constructed, installed, and tested on a level commensurate with the need to protect the health and safety of the public and plant operating personnel. It sets forth minimum staff recommendations and is not intended to prohibit the implementation of more rigorous design considerations, codes, standards, or quality assurance measures.

Working Group ANS-55, Radioactive Waste Systems, of Subcommittee ANS-50, Nuclear Power Plant System Engineering, of the American Nuclear Society Standards Committee has developed standards that establish requirements and provide recommendations for the design, construction, and performance of BWR (ANSI N197-1976) and PWR (ANSI N199-1976) liquid radioactive waste processing systems. Working Group ANS-55.6 is currently developing a standard that will combine and eventually replace N197 and N199. Two standards, ANSI/ANS 55.1-1979, "Solid Radioactive Waste Processing System for Light-Water-Reactor Plants," and ANSI/ANS 55.4-1979, "Gaseous Radioactive Waste Processing Systems for Light-Water-Reactor

*Lines indicate substantive changes from previous version.

[1] Radioactive waste, as used in this guide, means those liquids, gases, or solids containing radioactive materials that by design or operating practice will be processed prior to final disposition.

USNRC REGULATORY GUIDES

Regulatory Guides are issued to describe and make available to the public methods acceptable to the NRC staff of implementing specific parts of the Commission's regulations, to delineate techniques used by the staff in evaluating specific problems or postulated accidents, or to provide guidance to applicants. Regulatory Guides are not substitutes for regulations, and compliance with them is not required. Methods and solutions different from those set out in the guides will be acceptable if they provide a basis for the findings requisite to the issuance or continuance of a permit or license by the Commission.

Comments and suggestions for improvements in these guides are encouraged at all times, and guides will be revised, as appropriate, to accommodate comments and to reflect new information or experience. This guide was revised as a result of substantive comments received from the public and additional staff review.

Comments should be sent to the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Docketing and Service Branch.

The guides are issued in the following ten broad divisions:

1. Power Reactors
2. Research and Test Reactors
3. Fuels and Materials Facilities
4. Environmental and Siting
5. Materials and Plant Protection
6. Products
7. Transportation
8. Occupational Health
9. Antitrust and Financial Review
10. General

Copies of issued guides may be purchased at the current Government Printing Office price. A subscription service for future guides in specific divisions is available through the Government Printing Office. Information on the subscription service and current GPO prices may be obtained by writing the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Publications Sales Manager.

liquids and routing them to the liquid radwaste treatment system.

2. GASEOUS RADWASTE SYSTEMS

2.1 The gaseous radwaste treatment system[5] should meet the following criteria:

2.1.1 The systems should be designed and tested to requirements set forth in the codes and standards listed in Table 1 supplemented by regulatory positions 2.1.2 and 4 of this guide.

2.1.2 Materials for pressure-retaining components should conform to the requirements of the specifications for materials listed in Section II of the ASME Boiler and Pressure Vessel Code,[3] except that malleable, wrought, or cast iron materials and plastic pipe should not be used. Materials should be compatible with the chemical, physical, and radioactive environment of specific applications during normal conditions and anticipated operational occurrences. If the potential for an explosive mixture of hydrogen and oxygen exists, adequate provisions should be made to preclude buildup of explosive mixtures, or the system should be designed to withstand the effects of an explosion. Manufacturers' material certificates of compliance with material specifications such as those contained in the codes referenced in Table 1 may be provided in lieu of certified materials test reports.

2.1.3 Those portions of the gaseous radwaste treatment system that are intended to store or delay the release of gaseous radioactive waste, including portions of structures housing these systems, should be designed to the seismic design criteria given in regulatory position 5 of this guide. For the systems that normally operate at pressures above 1.5 atmospheres (absolute), these criteria should apply to isolation valves, equipment, interconnecting piping, and components located between the upstream and downstream valves used to isolate these components from the rest of the system (e.g., waste gas storage tanks in the PWR) and to the building housing this equipment. For systems that operate near ambient pressure and retain gases on charcoal adsorbers, these criteria should apply to the tank support elements (e.g., charcoal delay tanks in a BWR) and the building housing the tanks.

3. SOLID RADWASTE SYSTEM

3.1 The solid radwaste system consists of slurry waste collection and settling tanks, spent resin storage tanks, phase separators, and components and subsystems used to solidify radwastes prior to offsite shipment. The solid radwaste handling and treatment system should meet the following criteria:

3.1.1 The system should be designed and tested to the requirements set forth in the codes and standards listed in Table 1 supplemented by regulatory positions 3.1.2 and 4 of this guide.

3.1.2 Materials for pressure-retaining components should conform to the requirements of the specifications for materials listed in Section II of the ASME Boiler and Pressure Vessel Code,[3] except that malleable, wrought, or cast iron materials and plastic pipe should not be used. Materials should be compatible with the chemical, physical, and radioactive environment of specific applications during normal conditions and anticipated operational occurrences. Manufacturers' material certificates of compliance with material specifications such as those contained in the codes referenced in Table 1 may be provided in lieu of certified materials test reports.

3.1.3 Foundations and adjacent walls of structures that house the solid radwaste system should be designed to the seismic criteria given in regulatory position 5 of this guide to a height sufficient to contain the maximum liquid inventory expected to be in the building.

3.1.4 Equipment and components used to collect, process, or store solid radwastes need not be designed to the seismic criteria in regulatory position 5 of this guide.

4. ADDITIONAL DESIGN, CONSTRUCTION, AND TESTING CRITERIA

In addition to the requirements inherent in the codes and standards listed in Table 1, the following criteria, as a minimum, should be implemented for components and systems considered in this guide.

4.1 Radioactive waste management structures, systems, and components should be designed to control leakage and facilitate access, operation, inspection, testing, and maintenance in order to maintain radiation exposures to operating and maintenance personnel as low as is reasonably achievable. Regulatory Guide 8.8 provides guidelines acceptable to the NRC staff on this subject.

4.2 The quality assurance provisions described in regulatory position 6 of this guide should be applied.

4.3 Pressure-retaining components of process systems should use welded construction to the maximum practicable extent. Process systems include the first root valve on sample and instrument lines. Flanged joints or suitable rapid-disconnect fittings should be used only where maintenance or operational requirements clearly indicate that such construction is preferable. Screwed connections in which threads provide the only seal should not be used except for instrumentation and cast pump body drain and vent connections where welded connections are not suitable. Process lines should not be less than 3/4 inch (nominal). Screwed connections backed up by seal welding, mechanical joints, or socket welding may be used on lines 3/4 inches or larger but less than 2-1/2 inches. For lines 2-1/2 inches and above, pipe welds should be of the butt-joint type. Nonconsumable backing rings should not be used in lines carrying resins or other particulate material. All welding constituting the pressure boundary of pressure-retaining components

[5] For a BWR this includes the system provided for treatment of normal offgas releases from the main condenser vacuum system beginning at the point of discharge from the condenser air removal equipment; for a PWR this includes the system provided for the treatment of gases stripped from the primary coolant.

American Nuclear Society from ANSI N199-1976/ANS-55.2, "Liquid Radioactive Waste Processing System for Pressurized Water Reactor Plants."[2]

"4.2.3 Quality Control. The design, procurement, fabrication and construction activities shall conform to the quality control provisions of the codes and standards specified herein.[9] In addition, or where not covered by the referenced codes and standards, the following quality control features shall be established.

"4.2.3.1 System Designer and Procurer

"(1) Design and Procurement Document Control–Design and procurement documents shall be independently verified for conformance to the requirements of this standard by individual(s) within the design organization who are not the originators of the document. Changes to these documents shall be verified or controlled to maintain conformance to this standard.

"(2) Control of Purchased Material, Equipment and Services–Measures to ensure that suppliers of material, equipment and construction services are capable of supplying these items to the quality specified in the procurement documents shall be established. This may be done by an evaluation or a survey of the suppliers' products and facilities.

"(3) Handling, Storage, and Shipping–Instructions shall be provided in procurement documents to control the handling, storage, shipping and preservation of material and equipment to prevent damage, deterioration or reduction of cleanness.

"4.2.3.2 System Constructor

"(1) Inspection. In addition to required code inspections a program for inspection of activities affecting quality shall be established and executed by, or for, the organization performing the activity to verify conformance with the documented instructions, procedures, and drawings for accomplishing the activity. This shall include the visual inspection of components prior to installation for conformance with procurement documents and the visual inspection of items and systems following installation, cleanness and passivation (where applied).

"(2) Inspection, Test and Operating Status. Measures should be established to provide for the identification of items which have satisfactorily passed required inspections and tests.

"(3) Identification and Corrective Action for Items of Nonconformance. Measures should be established to identify items of nonconformance with regard to the requirements of the procurement documents or applicable codes and standards and to identify the action taken to correct such items."

In Section 4.2.3.2(3), "items of nonconformance" should be interpreted to include failures, malfunctions, deficiencies, deviations, and defective material and equipment.

Sufficient records should be maintained to furnish evidence that the measures identified above are being implemented. The records should include results of reviews and inspections and should be identifiable and retrievable.

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants regarding the NRC staff's plans for using this regulatory guide.

This guide reflects current NRC staff practice as outlined in Standard Review Plan Sections 11.2, 11.3, and 11.4. The method presented in this guide has been recognized as acceptable for complying with the Commission's regulations since November 1975.

Therefore, except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein is being and will continue to be used in the evaluation of the following applications:

1. Preliminary Design Approval (PDA) applications and Preliminary Duplicate Design Approval (PDDA) applications.

2. Final Design Approval, Type 2, (FDA-2) applications and Final Duplicate Design Approval, Type-2, (FDDA-2) applications.

3. Manufacturing License (ML) applications.

4. Construction Permit (CP) applications except for those portions of CP applications that reference standard designs (i.e., PDA, FDA-1, FDA-2, PDDA, FDDA-1, FDDA-2, or ML) or that reference qualified base plant designs under the replication option.

[9] Acceptable codes and standards are indicated in Table 1 of this guide.

REFERENCES

1. Kapur, K. K. and Shao, L. C., "Generation of Seismic Floor Response Spectra for Equipment Design," *Specialty Conference on Structural Design of Nuclear Power Plant Facilities, December 17-18, 1973* (ASCE, Chicago, 1973), Vol. 1, pp. 29-71.

2. Biggs, John M., "Seismic Response Spectra for Equipment Design in Nuclear Power Plants," *First International Conference on Structural Mechanics in Reactor Technology*, Germany (September 1971), EUR 4820, Paper K 4/7, North Holland Publishing Co., Amsterdam, the Netherlands.

3. Tokarz, F. J., Arthur D. F., and Murray, R. C., "Evaluation of Methods for Seismic Analysis of Mixed-Oxide Fuel Fabrication Plants,"* UCRL-51928, October 8, 1975.

*Copies may be obtained from the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161.