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SBilhorn & r/f
PDR + LPDR

See Pocket 6 for encl.

Dr. Donald L. Vieth, Director
Waste Management Project Office
U.S. Department of Energy
Nevada Operations Office
P.O. Box 14100
Las Vegas, NV 89114-4100

Subject: Information on Readiness Reviews and Computer Code QA

Dear Mr. Vieth:

Enclosed is the information on Readiness Reviews and computer code QA that was requested by NNWSI during the December 13-14, 1984 QA meeting in Las Vegas. The Readiness Review information consists of documents on a pilot program proposed by Georgia Power and Light for Plant Vogtle. The purpose of this Readiness Review program, proposed in response to findings reported in the Ford Amendment Study, is to increase the level of assurance that the plant's quality programs are accomplished in accordance with requirements. The Georgia Power and Light Company thinks that Readiness Reviews involving NRC participation would result in significant benefits, including increased predictability in the licensing process through early evaluation of program adequacy. Many of the features of this proposed program are already incorporated into the on-going prelicensing consultation and guidance phase of the repository program. The full applicability and usefulness of Readiness Reviews in the repository program will be the subject of future discussions between NRC and DOE staffs.

As you requested, we have also enclosed the Standard Review Plan for quality assurance (those parts of the plan that mention computer codes are asterisked) and the inspection procedure for computer codes from the IE Inspection Manual. As we noted during the December meeting, we believe that computer code QA is an important subject which requires additional discussion by our staffs in the near future.

WM Record File 102.2
WM Project 11
Docket No.
PDR ✓
LPDR ✓
Distribution:
(Return to WM, 623-SS) GORM

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WM-11 PDR

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5/5

Please contact Susan Bilhorn (FTS 427-4682) or James Kennedy (FTS 427-4786) if you have any questions on the enclosed material.

Sincerely,

/S/

Seth M. Coplan, Section Leader
Repository Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosures: (4)
As stated

cc: J. Blalock, DOE/NNWSI Las Vegas, NV
J. Neff, DOE/SRPO Columbus, OH
O. L. Olson, DOE/BWIPO Richland, WA
C. Newton, DOE-HQ/OGR Washington, D.C.
G. Langston, DOE-HQ/OCRWM Washington, D.C.

OFC	WMRP:ejc	WMRP	WMRP	WMRP		
NAME	SBilhorn	KStablein	JKennedy	HJMiller	SCoplan	
DATE	2/6/85	2/6/85	2/6/85	2/6/85	2/6/85	

Encl. to ltr to Vietti from Coplan - 2/8/85

84 OCT 3 P3:45

R. E. Conway

October 3, 1984

United States Nuclear Regulatory Commission
Office of Inspection and Enforcement
Region II - Suite 3100
101 Marietta Street
Atlanta, Georgia 30302

File: X7BD102
Log: GN-424

Reference: Readiness Review Program

Attention: Mr. James P. O'Reilly

Gentlemen:

PURPOSE

The purpose of this letter is to propose a pilot program for the systematic and disciplined review of Georgia Power Company's implementation of design, construction, and operational preparation processes to increase the level of assurance that Plant Vogtle's quality programs have been accomplished in accordance with regulatory requirements.

BACKGROUND

Georgia Power Company has long been concerned about the inability of a number of utilities to satisfactorily complete nuclear plants under construction on time, within budget, and in compliance with Nuclear Regulatory Commission requirements. A number of these problems appear to have been the result of major quality-related breakdowns in the management of plant construction or the utilities' inability to demonstrate the requisite quality. In a report to Congress on Improving Quality and the Assurance of Quality in the Design and Construction of Nuclear Power Plants (NUREG-1055), the Nuclear Regulatory Commission addressed these issues. In response to the question, "Why have the Nuclear Regulatory Commission and the utilities failed or been slow to detect and/or respond to these quality-related problems?", the Nuclear Regulatory Commission defined a number of shortcomings and recommended actions. One of the actions recommended for further analysis was the feasibility and benefits of Readiness Reviews which would involve formal assessments by the utility of their readiness to proceed at critical phases of a project and include possible involvement of Nuclear Regulatory Commission staff.

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DISCUSSION

In response to the concerns for past problems and in consideration of the potential benefits of Readiness Reviews addressed in NUREG-1055, Georgia Power Company has developed a proposed Readiness Review Program for Plant Vogtle. Attachment 1 to this letter is a Readiness Review Program plan which includes a discussion of objectives, responsibilities, review process, procedures, organization and schedules for implementing the plan.

The proposed Readiness Review Program does not eliminate or diminish any authorities or regulatory responsibilities now assigned to or exercised by the Nuclear Regulatory Commission or Georgia Power Company. Further, the proposed Readiness Review Program does not fundamentally change the techniques of inspections or assurance of quality program activities. Rather, the Readiness Review Program is a management system which provides for the more orderly planning and predictable execution of existing authorities and responsibilities.

In summary, the proposed Readiness Review Program actions include a clear definition and description of all work activities in terms of governing regulatory commitments, an in-depth Georgia Power Company self-assessment of the work activities, Nuclear Regulatory Commission review and actions on both the programatic and work implementation aspects of the work activities and a methodology for scheduling the separate Readiness Review Program actions of Georgia Power Company and the Nuclear Regulatory Commission.

The proposed plan incorporates several important features such as a Readiness Review Board, outside technical experts in the various disciplines, and a separate design review group all of which serve to provide independent oversight and review of Readiness Review Program actions and results.

CONCLUSION

Georgia Power Company considers that the proposed Readiness Review Program including the Nuclear Regulatory Commission's agreement to participate in the program would result in significant benefits. These benefits include improved planning which will enhance the effective use of critical Nuclear Regulatory Commission and Georgia Power Company resources and improved predictability resulting from the early Nuclear Regulatory Commission determination of program adequacy. Other benefits include enhanced assurance of the overall program acceptability resulting from Georgia Power Company's self-assessment combined with the phased independent Nuclear Regulatory Commission reviews, and improved stability by minimizing the potential for last minute identification of major programatic problems.

Georgia Power

In addition, Georgia Power Company considers that the successful demonstration of the proposed pilot Readiness Review Program at Vogtle could be a significant potential benefit to future nuclear projects. Specifically, the application of readiness reviews to individual critical work activities phased over the entire life of a future project would be a straightforward extension of the Readiness Review Program proposed for Vogtle. In this regard, all key plans, procedures and schedules associated with Vogtle pilot program will be available as public information for use as desired by the industry or NRC as a tool for future work.

PROPOSED ACTION

Based on the above, Georgia Power Company requests that the Nuclear Regulatory Commission agree to participate in the proposed pilot Readiness Review Program. Georgia Power Company recommends that the Nuclear Regulatory Commission establish a task group from the Office of Inspection and Enforcement to assist in the development of the Readiness Review Program procedures and schedules. It is further recommended that a task group from the Regional Office of Inspection and Enforcement be established to assist in the development of program procedures and schedules, and actions associated with work activity inspection and acceptance.

Yours very truly,

R. E. Conway

PDR/REC/jcb

Attachment

xc: J. H. Miller, Jr.
R. W. Scherer
R. J. Kelly
B. M. Guthrie
D. O. Foster
J. T. Beckham, Jr.
R. A. Thomas
D. E. Dutton
W. F. Sanders
P. D. Rice
E. L. Blake - Shaw, Pittman, Potts and Trowbridge
D. C. Teper - Georgians Against Nuclear Energy
L. Fowler - Legal Environmental Assistance Foundation
T. Johnson - Education Campaign for a Prosperous Georgia
J. E. Joiner - Troutman, Sanders, Lockerman, & Ashmore

READINESS REVIEW PROGRAM

PURPOSE

The purpose of the Readiness Review Program is to provide a systematic and disciplined review of Georgia Power Company's implementation of design, construction and operational preparation processes to increase the assurance that quality program activities at Plant Vogtle have been accomplished in accordance with regulatory requirements.

OBJECTIVE

The Readiness Review Program is a management system developed to accomplish the following objectives:

- Clearly define the individual work processes involved in the quality program at Plant Vogtle and describe how these processes comply with regulatory commitments.
- Provide a phased in-depth self-assessment of all work processes and a separate management overview of the self-assessment process including an expert evaluation of both the readiness review assessment and its conclusions.
- Enhance the identification of problems or concerns and ensure their correction in a timely manner.
- Provide a mechanism for the early resolution of any differences in the Nuclear Regulatory Commission and Georgia Power Company interpretation of regulatory requirements and the resulting acceptance criteria.
- Provide a system that will facilitate the Nuclear Regulatory Commission's review, inspection, appropriate action and approval of the acceptability of Vogtle work processes on an advanced readiness review basis.
- Provide a planning system, including Georgia Power Company prepared and Nuclear Regulatory Commission accepted milestone schedules, for the orderly conduct of the separate actions of Georgia Power Company and Nuclear Regulatory Commission.

AUTHORITIES AND REGULATORY RESPONSIBILITIES

Nothing in this program eliminates or diminishes any regulatory responsibilities or authorities now assigne. to or exercised by the Nuclear Regulatory Commission or Georgia Power Company. Further, the Readiness Review Program does not fundamentally change the techniques of inspection of quality program activities. Rather, the Readiness Review Program provides for the improved planning and execution of existing responsibilities and authorities in a predictable and orderly manner.

READINESS REVIEW PROCESS

The scope of the Readiness Review Program encompasses the implementation of all aspects of design, construction and preparations for operation at Plant Vogtle. The overall scope of the program is divided into five broad generic functions: civil, mechanical, electrical, instrumentation and control, and readiness for plant operations (see enclosure 1). These generic functions are further divided into specific work activities (see enclosure 2 example) and from there into individual work elements (see enclosure 3 example).

The Readiness Review Program actions will generally be conducted at the work element level to review, assess and verify performance. The individual work elements in a specific work activity will be packaged and presented to the Nuclear Regulatory Commission for review and approval. Such a package is defined as a readiness review module. The total scope of work will be divided into approximately 25 readiness review modules (see enclosure 4).

The content of the individual modules is based on considerations such as work process logic, the scheduled sequence of work completion and the time period available for review. The content and structure of these modules will be developed by Georgia Power Company and submitted to the Nuclear Regulatory Commission for comment and acceptance.

READINESS REVIEW PHASES

The basic readiness review actions involve each readiness review module undergoing a four-phase process of Preparation/Evaluation, Presentation/Module Review, Work Review, and Resolution/Approval. The following is a description of each phase of the readiness review module process.

- **Preparation/Evaluation Phase - Phase I**

  This phase of the readiness review process consists of:

  - Georgia Power Company preparation of the readiness review modules,
  - Georgia Power Company assessment and certification of the adequacy of all work activities covered in the module,
  - Readiness Review Board review and concurrence that all work activities covered by a module were performed satisfactorily, and
  - Vice President and Project General Manager of the Vogtle Project approval of the module.

Each module will include a definition of the scope of work covered in the module. This scope is broken down by work activities and ultimately into a detailed list of the individual work elements that are involved in the module scope. Each of the work elements or group of work elements will be described in terms of subjects such as the following:

- applicable commitments,
- governing specifications,
- detailed description of the work process,
- timing of work accomplishment,
- criteria for acceptance of work,
- scope and methods of documentation,
- responsible organization and interface activities,
- nonconformance and corrective action processes,
- significant problems,
- reportable events,
- applicable Quality Assurance audits, and
- applicable Nuclear Regulatory Commission inspections.

Matrices will be prepared to identify key review material such as regulatory commitments, specifications and procedures as a function of work element and time.

Having so defined and described each work element or logical group of elements, GPC will formally assess the elements to determine that the quality program and its implementation have complied with Georgia Power Company commitments and Nuclear Regulatory Commission regulatory requirements. Additional reviews, inspections or audits will be conducted wherever necessary to verify proper accomplishment of the work elements. Each assessment of work elements will be signed off by an individual responsible for the assessment certifying that the work elements have been addressed properly and are ready for Nuclear Regulatory Commission review.

In addition to the self-assessment of module work elements discussed above, Georgia Power Company will establish a Design Review Group within the Readiness Review Task Force consisting of three or more senior experienced design engineers who are

independent of those personnel who performed the work. The function of this group will be to conduct a continuing detailed review of the design process to provide added assurance that the design activities defined and described in the readiness review module have been performed in accordance with all commitments. A particular focus of this group will be to examine the interface actions among design disciplines to insure that there are no discontinuities in design work covered by the various readiness review modules.

When all work elements in the readiness review module have been assessed and certified as properly implemented, an independent Georgia Power Company Readiness Review Board will conduct an evaluation of the readiness review module to verify that the overall work activities have been addressed satisfactorily and that all Readiness Review Program actions have been completed properly.

Upon satisfactory completion of the Readiness Review Board evaluation, the Vice President and Project General Manager of the Vogtle Project will make a final determination of acceptability of the readiness review module.

- **Presentation/Module Review Phase - Phase II**

  Upon determining that the readiness review module is satisfactory, the Vice President and Project General Manager of the Vogtle Project will formally submit the readiness review module to the Regional Administrator of the Nuclear Regulatory Commission for review and acceptance. The presentation process will include a brief meeting to outline the scope of the readiness review module and identify any particular aspects that Georgia Power Company may want to highlight to the Nuclear Regulatory Commission. It is expected that the readiness review module would thereafter undergo a multi-discipline review by applicable Nuclear Regulatory Commission organizations to verify the effectiveness of the Georgia Power Company quality program for work areas covered in the module. It is expected that this review would examine definition of commitments, adequacy of commitment application and proper interpretation of criteria for work acceptance. Further, it is expected that either a positive finding of program adequacy would be identified to Georgia Power Company or any concerns with the program defined in the readiness review module would be conveyed for action, as appropriate.

- **Work Review Phase - Phase III**

  Upon completion of Nuclear Regulatory Commission review of the readiness review module, it is expected that the Nuclear Regulatory Commission would identify selected work activities

covered by the readiness review module for additional Nuclear Regulatory Commission inspection. For these instances, Georgia Power Company would take all necessary actions to support and assist the Nuclear Regulatory Commission inspection including the collection and assembly of documentation, the supply of requested personnel for interviews or inspection assistance and the resolution of all questions or requests for additional information. Georgia Power Company would make every effort to address all inspector requests and questions during the Nuclear Regulatory Commission on-site inspection process.

- **Resolution/Approval Phase - Phase IV**

  Upon completion of additional Nuclear Regulatory Commission inspections of the readiness review module work activities, it is expected that the Nuclear Regulatory Commission would identify any significant areas of noncompliance in accordance with existing Nuclear Regulatory Commission inspection and enforcement policies (e.g. 10CFR2, Appendix C). Georgia Power Company will investigate, assess and correct any items so identified in a thorough and rigorously scheduled manner in order to promptly and completely resolve all concerns and to avoid any recurring questions or concerns in subsequently scheduled areas of readiness review.

  Upon satisfactory completion of Nuclear Regulatory Commission inspections of readiness review module work activities, including satisfactory resolution of any resulting concerns, it is expected that the Nuclear Regulatory Commission would formally identify to Georgia Power Company that the scope of work covered by the readiness review module had been reviewed programmatically and for implementation and was deemed satisfactory subject to completion of remaining work in full compliance with all commitments. It is further expected that any work covered by the scope of the readiness review module that had not yet been completed due to the project work sequence would be factored into normal Nuclear Regulatory Commission site inspection activities with the Georgia Power Company commitment to assist the Nuclear Regulatory Commission in subsequent inspections in the same manner as during the readiness review module inspection activities. The Nuclear Regulatory Commission would be formally notified of any subsequent significant changes to the quality program that would affect the completed module.

PROCEDURES

Formal procedures will be developed to control the Georgia Power Company actions involved in the Readiness Review Program. These procedures will include requirements and guidance for readiness review organization, readiness review personnel training, module content, module preparation,

module evaluation including specific criteria for performing the evaluation, criteria for evaluation acceptance, criteria for handling concerns identified during readiness review, preparation and issuance of schedules, and handling of changes to the readiness review procedures. These procedures will be approved by the Readiness Review Program Manager, the Quality Assurance Department and the Readiness Review Board. Readiness review procedures and their changes will be submitted to the Nuclear Regulatory Commission for information.

ORGANIZATION

The Georgia Power Company organization for implementing the Readiness Review Program will consist of a Readiness Review Task Force and an independent Readiness Review Board.

The Readiness Review Task Force will consist of engineering and support personnel selected for their expertise from applicable design, construction, operations and quality disciplines. These personnel will report through readiness review discipline managers who report to the Readiness Review Program Manager.

The Readiness Review Board will consist of Georgia Power Company technically experienced senior managers and one or more independent technical experts. These technical experts will be selected based on their broad technical background in a particular discipline and will rotate on the board to serve for module reviews appropriate to their area of expertise.

Personnel on the task force and the Readiness Review Board will be trained on the Readiness Review Program procedures and their qualifications will be documented.

Both the Readiness Review Task Force Manager and the Readiness Review Board Chairman report to the Senior Vice President Nuclear, Georgia Power Company.

READINESS REVIEW SCHEDULES

Readiness review modules will be prepared and submitted to the Nuclear Regulatory Commission at a rate of approximately two modules per month. Enclosure 5 is a preliminary schedule showing the anticipated sequence of module development and issue. Georgia Power Company will develop specific readiness review schedules that will include commitment dates for Georgia Power Company presentation of readiness review modules to the Nuclear Regulatory Commission and agreed upon time frames for subsequent Georgia Power Company and Nuclear Regulatory Commission Readiness Review Program actions. These schedules will be submitted to the Nuclear Regulatory Commission for approval and Georgia Power Company will update schedules at three month intervals or more frequently if required to make any necessary adjustments resulting from work schedule changes or unforeseen problems.

(Enclosure 1)

PLANT VOGTLE GENERIC FUNCTIONS

I. CIVIL

II. MECHANICAL

III. ELECTRICAL

IV. INSTRUMENTATION AND CONTROLS

V. PLANT OPERATIONS

(Enclosure 2)

PLANT VOGTLE - WORK ACTIVITIES FOR CIVIL FUNCTIONAL AREA

I. CIVIL

A. CONCRETE

B. REBAR AND CADWELDS

C. STRUCTURAL STEEL, MISCELLANEOUS STEEL AND EMBEDS

D. WELDING

E. BACKFILL

F. COATINGS

G. POST TENSIONING

PLANT VOGTLE - WORK ELEMENTS FOR CIVIL CONCRETE, REBAR AND CADWELD WORK ACTIVITIES

I. CIVIL

A. CONCRETE

1. DESIGN

a. Design criteria
b. Control procedures
c. Specifications
d. Analysis and calculations
e. Interfaces
f. Seismic classification
g. Drawing types
h. Change control
i. Problem resolution
j. Documentation
k. Verification of as-built condition through FCR's, DR's and NCR's
l. Mix design
m. Design evaluation reports (DER's)

2. MATERIALS

a. Identification and specification of materials
b. Certification and tests by suppliers
c. Procurement
d. Receipt
e. Storage
f. Release for use
g. Vendor control

3. TRAINING AND QUALIFICATION

a. Receipt and storage inspectors
b. Batch plant operators and inspectors
c. Laboratory and fresh testing inspectors
d. Placement inspectors
e. Surveyors
f. Craft personnel

4. FABRICATION AND INSTALLATION

a. Construction procedures
b. Formwork, waterstop and waterproofing
c. Batching
d. Placing, finishing and curing
e. Core drilling
f. Equipment pad grouting and drypacking

5. INSPECTION

a. Receipt and storage inspection
b. Preplacement inspection
c. Placement and post-placement inspection
d. Lab inspection
e. Core drill inspection

6. TESTING

   a. Concrete materials receiving (gradation, water, cement, fly ash and admixtures)
   b. In-process materials (slump, air content, compressive strength)

7. MEASURING AND TEST EQUIPMENT

   a. Calibration
   b. Maintenance

8. FIELD DOCUMENT CONTROL

   a. Receipt/control
   b. Issuance
   c. Changes

9. AUDITS

   a. GPC audits and responses
   b. NRC inspections and GPC responses
   c. Special investigations/evaluations and responses

      - INPO
      - SIE
      - Cadweld review
      - Design control

10. REPORTABLE DEFICIENCIES

B. REBAR AND CADWELD

1. DESIGN

   a. Design criteria
   b. Control procedures
   c. Specifications
   d. Analysis and calculations
   e. Interfaces
   f. Seismic classification
   g. Drawing types
   h. Change control
   i. Problem resolution
   j. Documentation
   k. Verification of as-built condition through FCR's, DR's and NCR's
   l. Design evaluation reports (DER's)

2. MATERIALS

   a. Identification and specification of materials
   b. Certification and tests by suppliers
   c. Procurement
   d. Receipt
   e. Storage
   f. Release for use
   g. Vendor control

3. TRAINING AND QUALIFICATION

   a. Receipt and storage inspectors
   b. Iron worker and cadweld operator training
   c. Laboratory and rebar inspector training

4. FABRICATION AND INSTALLATION

   a. Site fabrication of rebar
   b. Rebar installation
   c. Cadweld installation
   d. Repair procedures

5. INSPECTION

   a. Receipt, storage and inspection
   b. Rebar and cadweld inspection

6. TESTING

   a. Cadweld testing

7. MEASURING AND TEST EQUIPMENT

   a. Calibration
   b. Maintenance

8. FIELD DOCUMENT CONTROL

   a. Receipt/control
   b. Issuance
   c. Changes

9. AUDITS

   a. GPC audits and responses
   b. NRC inspections and GPC responses
   c. Special investigations/evaluations and responses

      o INPO
      o SIE
      o Cadweld review
      o Design control

10. REPORTABLE DEFICIENCIES

(Enclosure 4)

READINESS REVIEW MODULES

I. CIVIL

- A. CONCRETE
- B. REBAR AND CADWELDS
- C. STRUCTURAL STEEL, MISCELLANEOUS STEEL AND EMBEDS
- D. WELDING
- E. BACKFILL
- F. COATINGS
- G. POST TENSIONING

II. MECHANICAL

- A. NSSS
- B. PIPE HANGERS/SUPPORTS
- C. PIPING/VALVES/PUMPS
- D. HVAC AND EQUIPMENT
- E. FIRE PROTECTION
- F. INSULATION

III. ELECTRICAL

- A. RACEWAYS
- B. CABLE INSTALLATION
- C. EQUIPMENT
- D. HANGERS/SUPPORTS
- E. TERMINATIONS
- F. FIRE BARRIERS

IV. INSTRUMENTATION AND CONTROLS

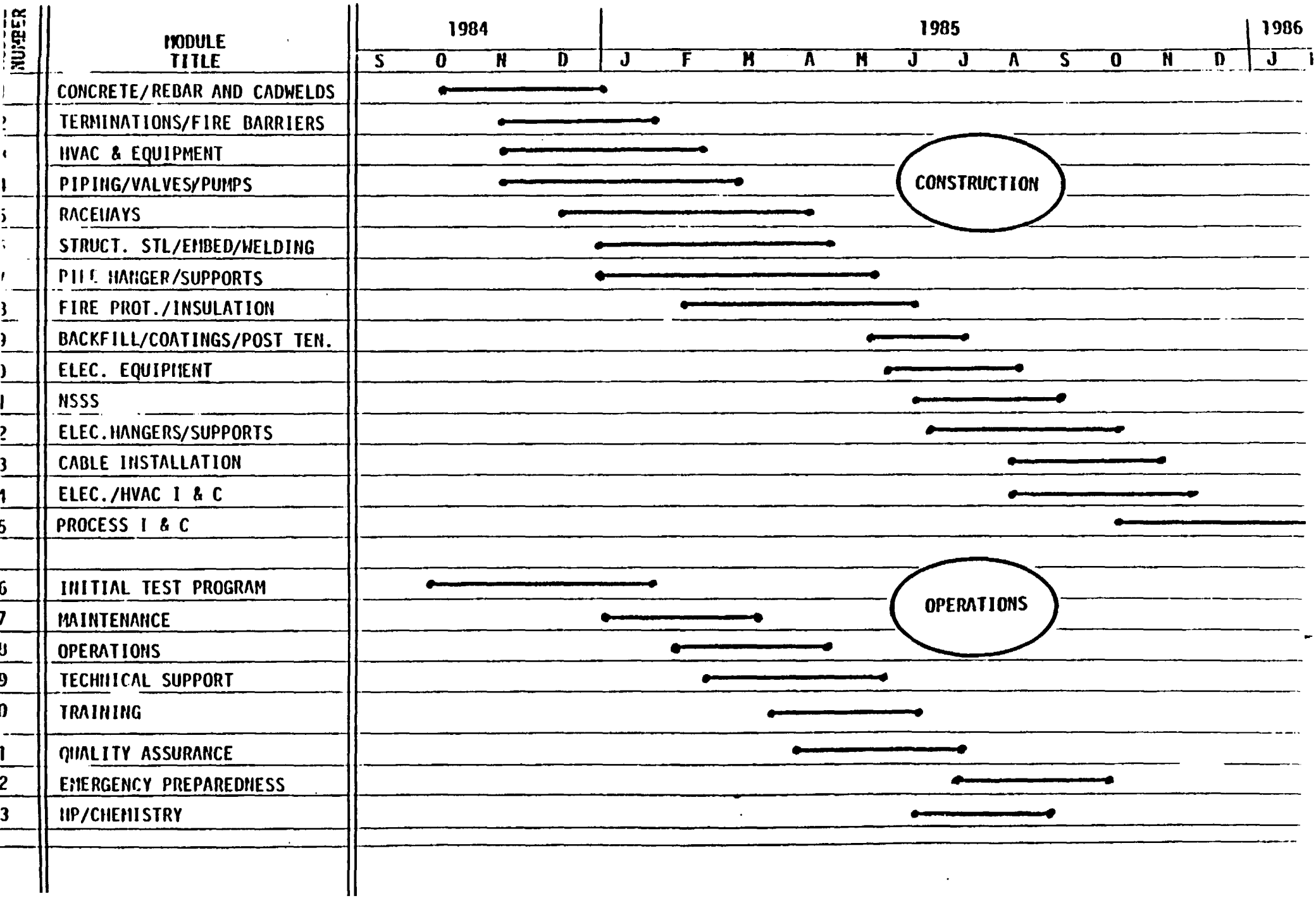
- A. PROCESS I & C
- B. ELECTRICAL I & C
- C. HVAC I & C

V. PLANT OPERATIONS

- A. OPERATIONS
- B. MAINTENANCE
- C. TECHNICAL SUPPORT
- D. INITIAL TEST PROGRAM
- E. EMERGENCY PREPAREDNESS
- F. QUALITY ASSURANCE
- G. TRAINING
- H. HEALTH PHYSICS/CHEMISTRY

(Enclosure 5)

READINESS REVIEW PROGRAM
PRELIMINARY PERFORMANCE SCHEDULE



READINESS REVIEW PILOT PROGRAM AT VOGTLE

PURPOSE: PROVIDE A SYSTEMATIC AND DISCIPLINED REVIEW OF GEORGIA POWER COMPANY'S IMPLEMENTATION OF DESIGN, CONSTRUCTION, AND OPERATIONS PROGRAMS

PLANT STATUS: VOGTLE UNIT 1 IS APPROXIMATELY 75% COMPLETE. UNIT 2 IS APPROXIMATELY 50% COMPLETE. FUEL LOADING IN UNIT 1 IS PROJECTED FOR FALL OF 1986.

OBJECTIVES OF READINESS REVIEW PILOT PROGRAM AT VOGTLE

GEORGIA POWER COMPANY:

- CONDUCT AN IN-DEPTH SELF-ASSESSMENT
- DEMONSTRATE COMPLIANCE
- ASSESS READINESS TO OPERATE PLANT SAFETY

NRC:

- TEST APPLICATION OF READINESS REVIEW CONCEPT MASTER INSPECTION PLAN, AND INCREMENTAL NRC ACCEPTANCE OF COMPLETED WORK
- IMPROVE COORDINATION AND TIMING OF NRR REVIEW AND REGIONAL INSPECTION ACTIVITIES
- PROVIDE SINGLE FOCUS BETWEEN NRC AND LICENSEE ON IMPLEMENTATION ISSUES

GEORGIA POWER COMPANY AND NRC

- PROVIDE EARLY IDENTIFICATION AND RESOLUTION OF PROBLEMS, ISSUES, AND CONTENTIONS
- PROVIDE MORE STRUCTURED SYSTEM FOR LICENSEE AND NRC REVIEW, INSPECTION, RESOLUTION, AND ACCEPTANCE OF COMPLETED WORK AND READINESS TO PROCEED
- DEMONSTRATE THAT PREDICATBILITY AND STABILITY IS POSSIBLE IN NUCLEAR REGULATION

WHAT IS A READINESS REVIEW?

WORKING DEFINITION: A FORMAL ASSESSMENT OF THE IMPLEMENTATION OF A PROGRAM OR PROJECT TO DETERMINE:

1. THE PREPAREDNESS OF THE RESPONSIBLE PERSONNEL, THE PLANT, AND THE MANAGEMENT SYSTEMS TO PROCEED TO THE NEXT MAJOR PHASE OF THE PROJECT, AND

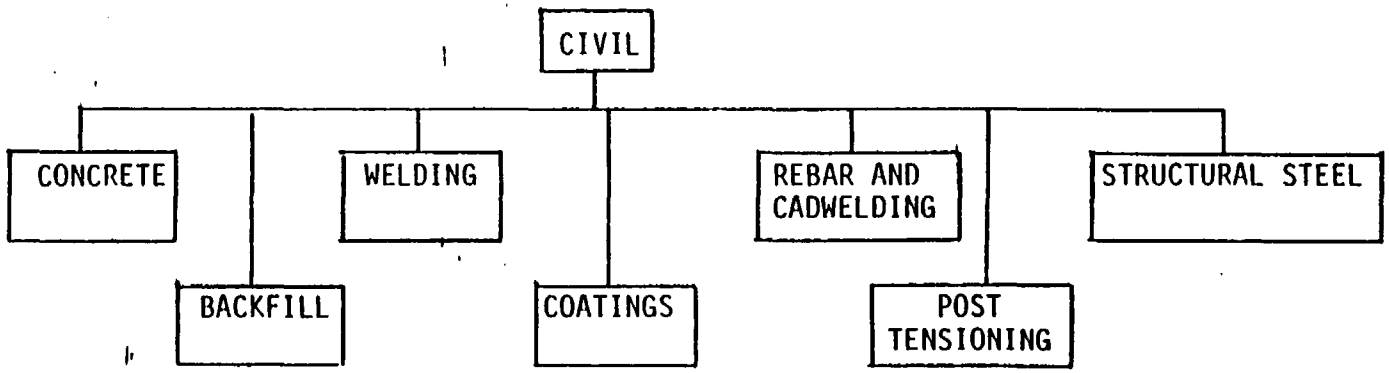
2. THE CONFORMANCE WITH REQUIREMENTS.

SCOPE OF READINESS REVIEW PROGRAM

PROGRAM SCOPE: ALL ASPECTS OF DESIGN, CONSTRUCTION, AND PREPARATION FOR OPERATION

READINESS REVIEW MODULES: PROJECT ACTIVITIES ARE DIVIDED INTO FIVE BROAD GENERIC WORK FUNCTIONS (CIVIL, MECHANICAL, ELECTRICAL, INSTRUMENTATION AND CONTROL, AND NUCLEAR OPERATIONS).

EACH WORK FUNCTION IS FURTHER SUBDIVIDED INTO READINESS REVIEW MODULES (APPROXIMATELY 25 IN TOTAL), FOR EXAMPLE:



READINESS REVIEW MODULE CONTENTS

- A DEFINITION OF THE SCOPE OF WORK COVERED IN THE MODULE
- A DESCRIPTION OF ALL THE WORK ELEMENTS INCLUDED IN THE MODULE WITH MATRICES TO SHOW:
  - EACH WORK ACTIVITY AS A FUNCTION OF REGULATORY REQUIREMENTS AND GPC COMMITMENTS
  - REGULATORY REQUIREMENTS AND GPC COMMITMENTS AS A FUNCTION OF TIME
  - EACH WORK ACTIVITY AS A FUNCTION OF APPLICABLE GPC SPECIFICATIONS AND PROCEDURES
  - GPC SPECIFICATIONS AND PROCEDURES AS A FUNCTION OF TIME
  - EACH WORK ELEMENT AS A FUNCTION OF CONTRACTOR
- GPC ASSESSMENT OF COMPLETENESS AND IMPLEMENTATION OF PROGRAMS
- INDEPENDENT REVIEW BY GPC DESIGN REVIEW BOARD (SIMILAR TO IDVP TYPE ACTIVITY)
- REVIEW BY SENIOR MANAGEMENT OF GPC, BECHTEL, AND SOUTHERN SERVICES ON A SPECIAL READINESS REVIEW BOARD
- FINAL DETERMINATION OF ACCEPTABILITY OF MODULE BY GPC VICE-PRESIDENT AND PROJECT GENERAL MANAGER OF VOGTLE

READINESS REVIEW PROCESS

READINESS REVIEW PILOT PROGRAM WILL BE CONDUCTED OVER THE NEXT TWO YEARS. READINESS REVIEW MODULE PROCESS INCLUDES:

1. PREPARATION/EVALUATION PHASE - VICE-PRESIDENT AND PROJECT GENERAL MANAGER OF VOGTLE REVIEW AND APPROVES MODULE.

2. PRESENTATION/MODULE REVIEW PHASE - PRESENTATION OF MODULE BY GEORGIA POWER AND REVIEW AND AUDIT OF MODULE BY NRC.

3. WORK REVIEW PHASE - NRC INSPECTION OR REINSPECTION OF SELECTED AREAS IN READINESS REVIEW MODULE. NRC VERIFICATION OF LICENSEE IMPLEMENTATION ACTIVITIES.

4. RESOLUTION/ACCEPTANCE PHASE - UPON COMPLETION OF NRC REVIEW/INSPECTION ACTIVITIES IN PHASES 2 AND 3, RESOLUTION OF ANY PROBLEMS OR ISSUES. NRC ACCEPTANCE OF THE READINESS REVIEW MODULE.

SCHEDULE FOR GPC SUBMITTAL OF READINESS REVIEW MODULES

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-----------------1985-------------        -----------------1986-------------------

JAN          APR       JULY       OCT       JAN            APR                JULY
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A B C D E  F G H I J  KL   MN    O   P      Q        R
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KEY

LETTER	MODULE	LETTER	MODULE
A	CONCRETE/REBAR/CADWELD	K	BACKFILL/COATINGS/POST-TENSIONING
B	INITIAL TEST PROGRAM	L	QUALITY ASSURANCE
C	TRAINING	M	EMERGENCY PREPAREDNESS
D	MAINTENANCE	N	NSSS
E	PROCESS PIPINGS	N	CABLE INSTALLATION
E	TERMINATIONS	O	ELECTRICAL HANGERS & SUPPORTS
F	STRUCTURAL STEEL/EMBEDS/WELDING	P	I&C PROCESS
G	OPERATIONS	P	RACEWAYS
H	TECHNICAL SUPPORT	Q	FIRE PROTECTION/INSULATION
I	HEALTH PHYSICS/CHEMISTRY	R	HVAC AND EQUIPMENT
J	PIPE SUPPORTS	R	ELECTRICAL HVAC AND I&C
J	ELECTRICAL EQUIPMENT		

STATUS AND SCHEDULE

1984	
SEPTEMBER	THREE MEETINGS WITH GPC, EDO, RII, IE, NRR, AND ELD TO DISCUSS CONCEPT OF READINESS REVIEW PILOT PROGRAM
	GPC AND NRC WORKING MEETINGS TO DEVELOP CONCEPT FOR READINESS REVIEWS INTO PILOT PROGRAM
OCTOBER 3	GPC LETTER TO NRC REQUESTING NRC PARTICIPATION IN PILOT PROGRAM
OCTOBER 17	MEETING WITH GPC, RII, IE, NRR, AND PUBLIC INTERVENORS TO DISCUSS READINESS REVIEW DEVELOPMENT EFFORTS
NOVEMBER	NRC RESPONSE TO GPC AND AGREEMENT TO PARTICIPATE IN PILOT PROGRAM
	COMMISSION INFORMATION PAPER TO DESCRIBE THE READINESS REVIEW PILOT PROGRAM, THE ROLES OF NRC AND NRC OFFICES, AND THE RESOURCE ESTIMATES
	DEVELOP PROGRAMS AND PROCEDURES FOR NRC ROLE AND PARTICIPATION IN PILOT PROGRAM
DECEMBER	BRIEFING TO THE COMMISSION ON PILOT PROGRAM BY GPC AND NRC STAFF
	FINALIZE NRC PROGRAMS AND PROCEDURES FOR PILOT PROGRAM
1985	
JANUARY	GPC COMPLETION OF FIRST READINESS REVIEW MODULE
	NRC INITIATES REVIEW OF MODULE

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
Washington, D.C. 20555

INSPECTION AND ENFORCEMENT MANUAL

DRP

INSPECTION PROCEDURE 37998

COMPUTER CODE DEVELOPMENT AND USE

PROGRAM APPLICABILITY: 2700, 2710

37998-01 INSPECTION OBJECTIVES

The objective of this inspection procedure is to assure that (a) computer codes used in the design and analysis of structures, systems, and components important to safety are developed and used in accordance with NRC requirements and guidance for design control of computer codes, and (b) the licensee or vendor, as applicable, has a procedure which ensures that the Commission will be notified of matters reportable under NRC regulations 10 CFR 21, and 10 CFR 50.55(e), as applicable. Such matters may include computer code errors.

37998-02 INSPECTION REQUIREMENTS

021 Procedures/Programmatic

a. Determine whether there are adequate procedures covering the requirements pertinent to computer codes in ANSI N45.2.11 - 1974. As a minimum the procedures should cover items listed in Section 031a.

b. Determine whether procedures for reporting problems and events to the NRC [per 10 CFR Parts 21,and 50.55(e)] include consideration of computer code errors.

c. Determine whether the procedures referred to in 021 a and b above are being implemented for computer codes in general. Implementation of some requirements requires in-depth review of specific codes and is covered below.

022 Implementation - Program Development/Verification

a. Determine the level and extent of independent review of the computer code.

b. Determine whether the code has been verified in a technically adequate manner by qualified individuals.

023 Implementation - Program Use/Qualification

a. Determine whether documentation available to users, e.g., users manual, is adequate to ensure correct use of the code in design analysis applications.

b. Select a particular code and evaluate its application to a specific problem(s). Determine through discussions with users whether:

1. The most current verified version of the code, applicable to the problem(s), is being used. All versions of the code may not be applicable to the problem(s).

2. The problem input parameters are within the limits and boundary conditions for which the code was verified by the code developer.

3. The program is qualified as a correct representation of the specific physical problem.

4. Adequate controls exist for interfacing and independent review of problems with respect to input, output, and qualification (023 b.3 above)

37998-03 INSPECTION GUIDANCE

031 Procedures/Programmatic

a. The following is a list of requirements for computer code development and use which the NRC considers to relate to sections in ANSI N45.2.11 - 1974, as indicated below:

1. Identification of code version, revision, etc. (Sections 4.2, 4.5)

2. Formal notification of code users of code changes and/or changes in code status (Section 8.0)

3. Correcting codes with errors and design analysis work affected by the erroneous codes. (Section 9.0)

4. Examining procedures, in the event of a code error, to determine if an improved procedure may have precluded the error. (Section 9.2)

5. Documenting verification scope. (Sections 6.1, 6.3)

6. Qualification of code application to ensure that a code, which may be part of an overall analysis procedure, is used within its intended range of application. (Section 6.2)

NQA -1C - 1982 (reference 5) is an addendum to NQA - 1 - 1979 (reference 4), and provides guidance specific to computer codes as follows. Since NQA-1C-1982 has not yet been endorsed by the NRC, the guidance is presented for the information of the inspector rather than as a basis for enforcement action.

"3.1 Design Analyses

Computer programs may be utilized for design analysis without individual verification of the program for each application provided:

(a) The computer program has been verified to show that it produces correct solutions for the encoded mathematical model within defined limits for each parameter employed, and

(b) The encoded mathematical model has been shown to produce a valid solution to the physical problem associated with the particular application.

Computer programs shall be controlled to assure that changes are documented and approved by authorized personnel. Where changes to previously verified computer programs are made, verification shall be required for the change, including evaluation of the effects of these changes on (a) and (b) above.

Documentation of design analyses shall include identification of any computer calculation, including computer type, computer program (e.g., name), revision identification, inputs, outputs, evidence of or reference to computer program verification, and the bases (or reference thereto) supporting application of the computer program to the specific physical problem...."

b. No guidance is provided for 021b.

c. Evaluating whether procedures are implemented for codes in general should focus on whether systems are in place, as evidenced by documentation. Technical adequacy of the documentation should be evaluated as indicated in Sections 032 and 033 below. Inspection samples should be structured based on the attribute inspected. For example, inspect all codes

having had identified code errors in order to evaluate implementation of procedures per requirements in 031 a.3 and 4 above and 10 CFR Parts 21 and 50.55(e).

032 Implementation - Program Development/Verification

Experience has shown that no more than one or two computer codes can be reviewed in depth in an NRC inspection. Selection of the code(s) to review can be based on either heavy usage, history of code errors, information from the Office of Nuclear Reactor Regulation (NRR) as to problems and/or areas of concern, or importance to safety. The code application may dictate the selection, e.g., select an important analysis procedure and review all codes that comprise the procedure. It is generally more efficient to review the same code(s) for both program development/verification and program use/qualification (Sections 022 and 023, above). Participation by NRR either in background review or in the actual inspection is desirable.

a. During the code development, it is not practical to independently review the code verification (see below definition in 032b) because of the background required for understanding the logic that went into the code design. However, it is prudent to have an independent review of the equations, mathematical model, logic, etc., early in the development to ensure that the completed product will satisfy user needs. This is preferable to identifying problems when the code is being qualified for specific applications.

b. Verification of a computer code is a form of design verification, as defined in ANSI N45.2.11 - 1974. Computer code verification is the process of providing an adequate level of assurance or confidence that the program correctly does what it was designed to do, i.e., solves the model programmed independent of that model being a correct representation of any particular physical system. Since verification is independent of the specific code application, it is the responsibility of the program developer.

For complex codes, absolute verification would be time consuming, and is generally not considered practical by the code developer. The degree of verification depends on the specific portions/options of the program and range of parameters/boundary conditions for which the program has been verified, and the inspector should determine this. The inspector should identify portions/options which have safety significance and are not verified. In evaluating technical adequacy of verification, the inspector should look for accepted methods of verification which compare results for the verified code with results from alternative methods such as:

1. hand calculations;

2. other calculational methods, including other verified computer codes;

3. experiments and tests;

4. standard (benchmarked) problems having known solutions;

5. confirmed published data and correlations.

033 Implementation - Program Use/Qualification

a. Documentation available to users should indicate how to use the code, what modules, portions/options and parameters/boundary conditions of the code have been verified and the restrictions pertinent to code use. These items can be also reviewed for codes in general (Section 031 c above). A related item pertinent to codes in general is the organization's practice in using codes in design applications prior to completion of verification. The inspector should determine whether there is a specific time limit for using unverified codes, i.e., to allow the scheduled verification to be completed.

b. Qualification should be treated the same whether the computer codes are developed in-house or by a contractor, or whether they are nationally used. Qualification refers to assurance that an analysis procedure, which may be comprised of more than one computer code, is a correct representation of a particular physical problem. This involves modeling the problem with respect to structural approximation, description of material behavior, loading system, boundary conditions, etc., and ensuring that all of these are consistent with the verified limitations for the computer code(s) to be used in the analysis procedure. At a minimum, the inspector should find evidence that the designer has considered factors such as those above in determining that the computer code is a correct representation of the physical problem. There should be evidence of independent review of these technical considerations. In some cases, methods used to qualify the analysis procedure will be similar to those used by the code developer in code verification, i.e., making comparisons with simple problems that have known or accepted solutions, complex problems that have been previously solved by an established or widely accepted analysis procedure, or applicable experiments for which measured or analytically inferred data are available.

034 Experience and Training for Inspectors

The individual(s) performing this inspection are expected to understand the principles involved in developing and using computer programs for engineering application or analysis. This can be achieved through training or through experience in design engineering and/or computer programming. The principal training objective should be to become familiar with terminology and practices for developing, verifying, qualifying, and using computer programs. References 1-5 should be used. Experience can be gained by accompanying an experienced inspector on an inspection of computer program development and use.

References

1. Applicable NRC Quality Assurance Guidance

2. NUREG-0653, "Report on Nuclear Industry Quality Assurance Procedures for Safety Analysis Computer Code Development and Use", August 1980

3. Regulatory Guide 1.64/ANSI N45.2.11, "Quality Assurance Requirements for the Design of Nuclear Power Plants".

4. NQA - 1 -1979, "Quality Assurance Program Requirements for Nuclear Power Plants" (to be endorsed by NRC RG revision in late 1982).

5. NQA - 1C - 1982 - Addenda to NQA - 1 - 1979 - Provides explicit quality assurance requirements for computer codes used for design analyses (to be endorsed by NRC RG 1.28 revision in late 1982).

END

U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

OFFICE OF NUCLEAR REACTOR REGULATION

17.1 QUALITY ASSURANCE DURING THE DESIGN AND CONSTRUCTION PHASES

REVIEW RESPONSIBILITIES

Primary - Quality Assurance Branch (QAB)

Secondary - Mechanical Engineering Branch
Instrumentation & Control Systems Branch
Power Systems Branch
Accident Evaluation Branch
Radiological Assessment Branch
Hydrologic & Geotechnical Engineering Branch
Containment Systems Branch

I. AREAS OF REVIEW

QAB reviews and evaluates the description of the quality assurance (QA) program for the design and construction phases in each application for a construction permit (CP), a manufacturing license, or a standardized design approval in accordance with applicable portions of this section of the Standard Review Plan. The secondary review branches review the listing of structures, systems, and components (QA list) covered by the QA program for their areas of review responsibility in accordance with 2A1 of this section of the Standard Review Plan and documents the acceptability of the listing including any items that should be added or clarified by memo to the QAB. The review by MEB in this regard also addresses the areas of review responsibility normally assigned to ASB, RSB, CSB, PSB (except electrical), and SEB.

Pre-Docketing

Prior to docketing a CP application, the NRC performs a substantive review of the applicant's QA program description relative to ongoing design and procurement activities. This review and associated inspection are performed immediately after tendering of a CP application to determine that a satisfactory QA program has been established and is being implemented.

The pre-docketing substantive review places particular emphasis on the areas of organization, QA program, design control, procurement document control, and

USNRC STANDARD REVIEW PLAN

Standard review plans are prepared for the guidance of the Office of Nuclear Reactor Regulation staff responsible for the review of applications to construct and operate nuclear power plants. These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Standard review plans are not substitutes for regulatory guides or the Commission's regulations and compliance with them is not required. The standard review plan sections are keyed to the Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants. Not all sections of the Standard Format have a corresponding review plan.

Published standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C. 20555.

audit. The application is not docketed unless the established and implemented program in these areas has no substantive deviation from NRC QA guidance applicable to activities conducted prior to docketing. Representatives from the offices of NRR and IE may meet with the applicant's representatives nine to twelve months prior to tendering of the application to provide a clear understanding of what is expected in the QA program description and the implemented program in order for the program to be accepted during the substantive review and associated inspection.

Where an NRC-accepted QA topical report is referenced in the application, the referenced QA program is not re-reviewed except for conformance to the applicable staff positions in this SRP section and the Regulatory Guides in effect at the time of docketing the application. For the case of CP applications referencing a standard design that includes an approved QA program directly or by reference, the applicant need not conform to new or revised Regulatory Guides unless they contain regulatory positions determined to be significant to safety, as indicated in the implementation section of each guide.

Post-Docketing

The QAB review, after docketing, covers the QA controls to be applied by the applicant and principal contractors to activities that may affect the quality of structures, systems, and components important to safety. These activities include site testing and evaluation (starting with evaluation of exposed excavated surfaces, determination of site characteristics, and testing), designing, purchasing, fabricating, constructing, handling, shipping, storing, cleaning, erecting, installing, inspecting, and testing. This review extends to the determination of how the applicable requirements of the eighteen criteria of Appendix B to 10 CFR 50 are satisfied by the proposed QA program.

The areas of review are as follows:

1. ORGANIZATION

   A. Organizational description and charts of the lines, interrelationships and areas of responsibility and authority for all organizations performing quality-related activities, including the applicant's organization and principal contractors (architect engineer, nuclear steam supply system vendor, constructor, and construction manager when other than the constructor).

   B. Organizational location, degree of independence from the performing organization, and authority of the individuals assigned the responsibility for performing QA functions.

   C. Organizational provisions for assuring the proper implementation of the QA program.

2. QUALITY ASSURANCE PROGRAM

   A. Scope of the QA program.

   B. Provisions to assure proper definition of the QA program.

   C. Programmatic provisions to assure proper implementation of the QA program.

D. Provisions to assure adequacy of personnel qualifications.

3. DESIGN CONTROL

A. Scope of the QA program for design activities.

B. The organizational structure, activity, and responsibility of the positions or groups responsible for design activities.

C. Provisions to carry out design activities in a planned, controlled, and orderly manner.

D. Provisions for interface control.

E. Provisions to verify or check the technical adequacy of design documents.

F. Provisions to control design changes.

4. PROCUREMENT DOCUMENT CONTROL

A. Provisions which assure that applicable regulatory requirements, technical requirements, and QA program requirements are included or referenced in procurement documents.

B. Provisions for review and approval of procurement documents.

5. INSTRUCTIONS, PROCEDURES, AND DRAWINGS

A. Provisions for assuring that activities affecting quality are prescribed by and accomplished in accordance with documented instructions, procedures, or drawings.

B. Provisions for including quantitative and qualitative acceptance criteria in instructions, procedures, and drawings.

6. DOCUMENT CONTROL

A. Provisions to assure that documents, including changes, are reviewed for adequacy, approved for release by authorized personnel, and distributed and used at the location where the prescribed activity is performed.

B. Provisions to prevent the inadvertent use of obsolete or superseded documents.

7. CONTROL OF PURCHASED MATERIAL, EQUIPMENT, AND SERVICES

A. Provisions for the control of purchased material, equipment, and services; for selection of suppliers; and for assessing the adequacy of quality.

B. Provisions to assure that documented evidence of the conformance of material and equipment to procurement requirements is available at the plant site prior to installation or use.

8. IDENTIFICATION AND CONTROL OF MATERIALS, PARTS, AND COMPONENTS

A. Provisions to identify and control materials, parts, and components.

B. Provisions to assure that incorrect or defective items are not used.

9. CONTROL OF SPECIAL PROCESSES

A. Provisions to assure the acceptability of special processes such as welding, heat treating, nondestructive testing, and chemical cleaning.

B. Provisions to assure that special processes are performed by qualified personnel using qualified procedures and equipment.

10. INSPECTION

A. Provisions for the inspection of activities affecting quality, including the items and activities to be covered.

B. Organizational responsibilities and qualifications established for individuals or groups performing inspections.

C. Prerequisites to be provided in the written inspection procedures with provisions for documenting and evaluating inspection results.

11. TEST CONTROL

A. Provisions for tests which assure that structures, systems, and components will perform satisfactorily in service.

B. Prerequisites to be provided in written test procedures with provisions for documenting and evaluating test results.

C. Personnel qualification programs established for test personnel.

12. CONTROL OF MEASURING AND TEST EQUIPMENT

Provisions to assure that tools, gages, instruments, and other measuring and testing devices are properly identified, controlled, calibrated, and adjusted at specified intervals.

13. HANDLING, STORAGE, AND SHIPPING

Provisions to control handling, storage, shipping, cleaning, and preservation of items in accordance with work and inspection instructions to prevent damage, loss, and deterioration by environmental conditions such as temperature or humidity.

14. INSPECTION, TEST, AND OPERATING STATUS

Provisions to indicate the inspection, test, and operating status of items to prevent inadvertent use or bypassing of inspection and tests.

15. NONCONFORMING MATERIALS, PARTS, OR COMPONENTS

Provisions to control the use or disposition of nonconforming materials, parts, or components.

16. CORRECTIVE ACTION

Provisions to assure that conditions adverse to quality are promptly identified and corrected and that measures are taken to preclude repetition.

17. QUALITY ASSURANCE RECORDS

Provisions for the identification, retention, retrieval, and maintenance of records that furnish evidence of activities affecting quality.

18. AUDITS

A. Provisions for audits to verify compliance with all aspects of the QA program and to determine the effectiveness of the QA program.

B. Responsibilities and procedures for auditing, documenting and reviewing audit results, and designating management levels to review and assess audit results.

II. ACCEPTANCE CRITERIA

The applicant (and its principal contractors such as the NSSS vendor, A/E, constructor and construction manager) must establish a QA program for the design and construction phases in accordance with Appendix B to 10 CFR Part 50, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants." The applicant's QA program (including its principal contractors) must describe in the PSAR or SSAR how each criterion of Appendix B will be met. The acceptance criteria used by the QAB to evaluate this QA program are listed in the following eighteen subsections. The acceptance criteria include a commitment to comply with the regulations, regulatory positions presented in the appropriate issue of the Regulatory Guides, and the Branch Technical Position listed in subsection V. Thus, the commitment constitutes an integral part of the QA program description and requirements. Exceptions and alternatives to these acceptance criteria may be adopted by applicants provided adequate justification is given; the QAB review allows for considerable flexibility in defining methods and controls while still satisfying pertinent regulations. When the QA program description meets the applicable acceptance criteria of this subsection or provides acceptable exceptions or alternatives, the program is considered to be in compliance with pertinent NRC regulations.

The review will ascertain that the commitments and the description of how the commitments are implemented, to the extent necessary, are objective and stated in inspectable terms.

The Organization (17.1.1) elements responsible for the QA program are acceptable if:

1A1.* The responsibility for the overall program is retained and exercised by the applicant.

1A2. The applicant has identified and described major delegation of work involved in establishing and implementing the QA program or any part thereof to other organizations.

1A3. When major portions of the applicant's program are delegated:

a. Applicant describes how responsibility is exercised for the overall program. The extent of management oversight should be addressed including the location, qualifications, and criteria for determining the number of personnel performing these functions.

b. Applicant evaluates the performance (frequency and method stated - once per year although longer cycle acceptable with other evaluations of individual elements) of work by the delegated organization.

c. Qualified individual(s) or organizational element(s) are identified within the applicant's organization as responsible for the quality of the delegated work prior to initiation of activities.

1A4. Clear management controls and effective lines of communication exist for QA activities among the applicant and the principal contractors to assure direction of the QA program.

1A5. Organization charts clearly identify all the "onsite" and "offsite" organizational elements which function under the cognizance of the QA program (such as design, engineering, procurement, manufacturing, construction, inspection, test, instrumentation and control, nuclear engineering, etc.), the lines of responsibility, and a description of the criteria for determining the size of the QA organization including the inspection staff.

1A6. The applicant (and principal contractors) describes the QA responsibilities of each of the organizational elements noted on the organization charts.

1B1. The applicant (and principal contractors) identifies a management position that retains overall authority and responsibility for the QA program (normally, this position is the QA Manager) and this position has the following characteristics:

a. Is at the same or higher organization level as the highest line manager directly responsible for performing activities affecting quality (such as engineering, procurement, construction, and operation) and is sufficiently independent from cost and schedule.

*The alphanumeric designation for each acceptance criterion in subsection II indicates its relationship to the areas of review identified in subsection I.

b. Has effective communication channels with other senior management positions.

c. Has responsibility for approval of QA Manual(s).

d. Has no other duties or responsibilities unrelated to QA that would prevent his full attention to QA matters.

1B2. Verification of conformance to established requirements (except for designs, ref. 3E2) is accomplished by individuals or groups within the QA organization who do not have direct responsibility for performing the work being verified or by individuals or groups trained and qualified in QA concepts and practices and independent of the organization responsible for performing the task.

1B3. Persons and organizations performing QA functions have direct access to management levels which will assure the ability to:

a. Identify quality problems.

b. Initiate, recommend, or provide solutions through designated channels.

c. Verify implementation of solutions.

Those persons and organizations with the above authority are identified and a description of how those actions are carried out is provided.

1B4. a. Designated QA personnel, sufficiently free from direct pressures for cost/schedule, have the responsibility delineated in writing to stop unsatisfactory work and control further processing, delivery, or installation of nonconforming material.

b. The organizational positions with stop work authority are identified.

1B5. Provisions are established for the resolution of disputes involving quality, arising from a difference of opinion between QA personnel and other department (engineering, procurement, manufacturing, etc.) personnel.

1B6. Designated QA individuals are involved in day-to-day plant activities important to safety (i.e., the QA organization routinely attends and participates in daily plant work schedule and status meetings to assure they are kept abreast of day-to-day work assignments throughout the plant and that there is adequate QA coverage relative to procedural and inspection controls, acceptance criteria, and QA staffing and qualification of personnel to carry out QA assignments).

1C1. Policies regarding the implementation of the QA program are documented and made mandatory. These policies are established at the Corporate President or Vice President level.

1C2. Position description (see 1B1) assures that the individual directly responsible for the definition, direction, and effectiveness of the overall QA program has sufficient authority to effectively implement

responsibilities. This position is to be sufficiently free from cost and schedule responsibilities. Qualification requirements for this individual are established in a position description which includes the following prerequisites:

a. Management experience through assignments to responsible positions.

b. Knowledge of QA regulations, policies, practices, and standards.

c. Experience working in QA or related activity in reactor design, construction, or operation or in a similar high technological industry.

The qualifications of the QA Manager should be at least equivalent to those described in Section 4.4.5 of ANSI/ANS-3.1-1978, "Selection and Training of Nuclear Power Plant Personnel," as endorsed by the regulatory positions in Regulatory Guide 1.8.

1C3. The person at the construction site responsible for directing and managing the site QA program is identified by position and has appropriate organizational position, responsibilities, and authority to exercise proper control over the QA program. This individual is free from non-QA duties and can thus give full attention to assuring that the QA program at the plant site is being effectively implemented.

Activities related to Quality Assurance Program (17.1.2) are acceptable if:

2A1. The scope of the QA program includes:

a. A commitment that activities affecting structures, systems, and components important to safety will be subject to the applicable controls of the QA program. The structures, systems, components, and related consumables covered by the QA program are identified (QA list) in Section 3.2.1 of the SAR.*

b. A commitment that the preoperational test program will be conducted in accordance with the QA program and a description of how the QA program will be applied.

c. A commitment that the development, control, and use of computer code programs will be conducted in accordance with the QA program and a description of how the QA program will be applied.

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*Rulemaking is currently underway to clarify the requirement that structures, systems, and components important to safety as derived from the General Design Criteria of Appendix A to 10 CFR Part 50 shall be subjected to the pertinent requirements of the quality assurance criteria of Appendix B to 10 CFR 50. Until this rulemaking process is completed, staff reviewers should assure that the applicant's list of structures, systems, and components includes all those items necessary to prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public as stated in the Introduction to Appendix B. Guidance for identifying such items is provided in Regulatory Guide 1.29.

d. The identification of fire protection in SRP Section 9.5.1 as a system covered by the QA program or identification of the QA controls for fire protection. These controls are reviewed and accepted using the guidelines contained in BTP ASB 9.5-1 and 10 CFR Part 50 Appendix B as appropriate.

e. A commitment that special equipment, environmental conditions, skills, or processes will be provided as necessary.

2A2. A brief summary of the company's corporate QA policies is given.

2B1. a. Provisions are established to assure that quality-affecting procedures required to implement the QA program are consistent with QA program commitments and corporate policies and are properly documented, controlled, and made mandatory through a policy statement or equivalent document signed by the responsible official.

b. The QA organization reviews and documents concurrence with these quality-related procedures.

c. The organizational group or individual having responsibility for the policy statement should be identified.

d. The quality affecting procedural controls of the principal contractors should be provided for the applicant's review with documented agreement of acceptance prior to initiation of activities affected by the program.

2B2. Provisions are included for notifying NRC of changes (1) for review and acceptance in the accepted description of the QA program as presented or referenced in the SAR or SSAR prior to implementation, and (2) in organizational elements within 30 days after announcement. (Note - editorial changes or personnel reassignments of a non-substantive nature do not require NRC notification).

2B3. The applicant (and the principal contractors) commits to comply with the regulatory position in the appropriate issue of the Regulatory Guides listed in Subsection V; to comply with 10 CFR Part 50, §50.55a; to conduct activities under 10 CFR Part 50, §50.55(e) in accordance with the QA program; and to comply with 10 CFR Part 50 Appendix A, General Design Criterion 1. For systems, components, and structures covered by the ASME Code Section III (Classes 1, 2 and 3), the quality assurance code requirements should be supplemented by the specific guidance addressed in the regulatory positions of the applicable Regulatory Guides. The commitment identifies the Regulatory Guides and ANSI standard by number, title, and revision or date. Any alternatives or exceptions are clearly identified and supporting information presented in the docket. QA Regulatory Guides should be addressed which have an implementation date prior to the submittal or docket date of the QA program description.

Although primary responsibility for Regulatory Guides 1.26 and 1.29 is assigned to ASB (SRP Sections 3.2.1 and 3.2.2), their use as acceptance criteria in this SRP section is necessary to assure that

adequate quality assurance requirements are specified for systems, components, and structures addressed by those guides.

The QA organization and the necessary technical organizations participate early in the QA program definition stage to determine and identify the extent QA controls are to be applied to specific structures, systems, and components. This effort involves applying a defined graded approach to certain structures, systems, and components in accordance with their importance to safety and affects such disciplines as design, procurement, document control, inspection tests, special processes, records, audits, and others described in 10 CFR Part 50, Appendix B.

254. Existing or proposed QA procedures are identified reflecting that Regulatory Guides listed in subsection VI, General Design Criterion 1 of Appendix A to 10 CFR Part 50, 10 CFR Part 50, §50.55a, and each criterion of 10 CFR Part 50, Appendix B will be met by documented procedures. In addition, activities conducted under 10 CFR Part 50, §50.55(e) shall conform to the requirement of the QA program.

255. A description is provided that emphasizes how the docketed QA program description, particularly the 10 CFR Part 50 regulations and Regulatory Guides listed in subsection V, will be properly carried out.

201. A description is provided of how management (above or outside the QA organization) regularly assesses the scope, status, adequacy, and compliance of the QA program to 10 CFR Part 50, Appendix B. These measures should include:

a. Frequent contact with program status through reports, meetings, and/or audits.

b. Performance of an annual assessment preplanned and documented. Corrective action is identified and tracked.

202. Quality-related activities (such as design, procurement, and site investigation) initiated prior to formal NRC acceptance of the QA program are controlled under a QA program in accordance with this SRP and, accordingly, with the requirements of 10 CFR Part 50, Appendix B. Approved procedures and a sufficient number of trained personnel should be available to implement the applicable portion of the QA program prior to the initiation of the activity.

203. A summary description is provided on how responsibilities and control of quality-related activities are transferred from the principal contractors to the applicant during the phaseout of design and construction and during preoperational testing and plant turnover.

20. Indoctrination, training, and qualification programs are established such that:

a. Personnel responsible for performing quality-affecting activities are instructed as to the purpose, scope, and implementation of the quality-related manuals, instructions, and procedures.

b. Personnel verifying activities affecting quality are trained and qualified in the principles, techniques, and requirements of the activity being performed.

c. For formal training and qualification programs, documentation includes the objective, content of the program, attendees, and date of attendance.

d. Proficiency tests are given to those personnel performing and verifying activities affecting quality, and acceptance criteria are developed to determine if individuals are properly trained and qualified.

e. Certificate of qualifications clearly delineates (a) the specific functions personnel are qualified to perform and (b) the criteria used to qualify personnel in each function.

f. Proficiency of personnel performing and verifying activities affecting quality is maintained by retraining, reexamining, and/or recertifying as determined by management or program commitment.

g. The description of the training program provisions listed above satisfies the regulatory position in Regulatory Guide 1.58.

Activities related to Design Control (17.1.3) are acceptable if:

3A. The scope of the design control program includes design activities associated with the preparation and review of design documents including the correct translation of applicable regulatory requirements and design bases into design, procurement and procedural documents. Included in the scope are such activities as field design engineering; physics, seismic, stress, thermal, hydraulic, radiation, and the SAR accident analyses; associated computer programs; compatibility of materials; accessibility for inservice inspection, maintenance, and repair; and quality standards.

3B. Organizational responsibilities are described for preparing, reviewing, approving, and verifying design documents such as system descriptions, design input and criteria, design drawings, design analyses, computer programs, specifications, and procedures.

3C1. Errors and deficiencies in approved design documents, including design methods (such as computer codes), that could adversely affect structures, systems, and components important to safety are documented; and action is taken to assure that all errors and deficiencies are corrected.

3C2. Deviations from specified quality standards are identified and procedures are established to ensure their control.

3D. Internal and external design interface controls, procedures, and lines of communication among participating design organizations and across technical disciplines are established and described for the review, approval, release, distribution, and revision of documents involving design interfaces to assure structures, systems, and

components are compatible geometrically, functionally, and with processes and environment.

3E1. Procedures are established and described requiring a documented check to verify the dimensional accuracy and completeness of design drawing and specifications.

3E2. Procedures are established and described requiring that design drawings and specifications be reviewed by the QA organization to assure that the documents are prepared, reviewed, and approved in accordance with company procedures and that the documents contain the necessary quality assurance requirements such as inspection and test requirements, acceptance requirements, and the extent of documenting inspection and test results.

3E3. Guidelines or criteria are established and described for determining the method of design verification (design review, alternate calculations, or test).

3E4. Procedures are established and described for design verification activities which assure the following:

a. The verifier is qualified and is not directly responsible for the design (i.e., neither the performer or his immediate supervisor). In exceptional circumstances, the designer's immediate supervisor can perform the verification provided:

(1) The supervisor is the only technically qualified individual.

(2) The need is individually documented and approved in advance by the supervisor's management.

(3) QA audits cover frequency and effectiveness of use of supervisors as design verifiers to guard against abuse.

b. Design verification, if other than by qualification testing of a prototype or lead production unit, is completed prior to release for procurement, manufacturing, construction or to another organization for use in other design activities. In those cases where this timing cannot be met, the design verification may be deferred, providing that the justification for this action is documented and the unverified portion of the design output document and all design output documents, based on the unverified data, are appropriately identified and controlled. Construction site activities associated with a design or design change should not proceed without verification past the point where the installation would become irreversible (i.e., require extensive demolition and rework). In all cases, the design verification should be complete prior to fuel load for a plant under construction, or in the case of an operating plant, prior to relying upon the component, system, or structure to perform its function.

c. Procedural control is established for design documents that reflect the commitments of the SAR; this control differentiates between documents that receive formal design verification by

interdisciplinary or multi-organizational teams and those which can be reviewed by a single individual (a signature and date is acceptable documentation for personnel certification). Design documents subject to procedural control include, but are not limited to, specifications, calculations, computer programs, system descriptions, SAR when used as a design document, and drawings including flow diagrams, piping and instrument diagrams, control logic diagrams, electrical single line diagrams, structural systems for major facilities, site arrangements, and equipment locations. Specialized reviews should be used when uniqueness or special design considerations warrant.

d. The responsibilities of the verifier, the areas and features to be verified, the pertinent considerations to be verified, and the extent of documentation are identified in procedures.

3E3. The following provisions are included if the verification method is only by test:

a. Procedures provide criteria that specify when verification should be by test.

b. Prototype, component or feature testing is performed as early as possible prior to installation of plant equipment, or prior to the point when the installation would become irreversible.

c. Verification by test is performed under conditions that simulate the most adverse design conditions as determined by analysis.

3E4. Procedures are established to assure that verified computer codes are certified for use and that their use is specified.

3F1. Design and specification changes, including fields changes, are subject to the same design controls that were applicable to the original design.

3F2. The description of the design control provisions satisfies the criteria of Regulatory Guide 1.64.

Activities related to Procurement Document Control (17.1.4) are acceptable if:

4A1. Procedures are established for the review of procurement documents to determine that quality requirements are correctly stated, inspectable, and controllable; there are adequate acceptance and rejection criteria; and procurement documents have been prepared, reviewed, and approved in accordance with QA program requirements. To the extent necessary, procurement documents should require contractors and subcontractors to provide an acceptable quality assurance program. The review and documented concurrence of the adequacy of quality requirements stated in procurement documents is performed by independent personnel trained and qualified in QA practices and concepts.

4A2. Procedures are established to assure that procurement documents identify applicable regulatory, technical, administrative, and

reporting requirements; drawings; specifications; codes and industrial standards; test and inspection requirements; and special process instructions that must be complied with by suppliers.

4B1. Organizational responsibilities are described for (1) procurement planning; (2) the preparation, review, approval, and control of procurement documents; (3) supplier selection; (4) bid evaluations; and (5) review and concurrence of supplier QA programs prior to initiation of activities affected by the program. The involvement of the QA organization is described.

4B2. The description of the procurement document control provisions listed above satisfies the regulatory position in Regulatory Guide 1.123.

Activities related to Instructions, Procedures, and Drawings (17.1.5) are acceptable if:

5A. Organizational responsibilities are described for assuring that activities affecting quality are (1) prescribed by documented instructions, procedures, and drawings and (2) accomplished through implementation of these documents.

5B. Procedures are established to assure that instructions, procedures, and drawings include quantitative (such as dimensions, tolerances, and operating limits) and qualitative (such as workmanship samples) acceptance criteria for determining that important activities have been satisfactorily accomplished.

Activities related to Document Control (17.1.6) are acceptable if:

5A1. The scope of the document control program is described, and the types of controlled documents are identified. As a minimum, controlled documents include:

a. Design documents (e.g., calculations, drawings, specifications, analyses) including documents related to computer codes.

b. Procurement documents.

c. Instructions and procedures for such activities as fabrication, construction, modification, installation, test, and inspection.

d. As-built documents.

e. Quality assurance and quality control manuals and quality-affecting procedures.

f. Topical reports.

g. SAR.

h. Nonconformance reports.

5A2. Procedures for the review, approval, and issuance of documents and changes thereto are established and described to assure technical

adequacy and inclusion of appropriate quality requirements prior to implementation. The QA organization, or an individual other than the person who generated the document but qualified in quality assurance, reviews and concurs with these documents with regards to QA-related aspects.

6A3. Procedures are established to assure that changes to documents are reviewed and approved by the same organizations that performed the initial review and approval or by other qualified responsible organizations delegated by the applicant.

6A4. Procedures are established to assure that documents are available at the location where the activity will be performed prior to commencing the work.

6B1. Procedures are established and described to assure that obsolete or superseded documents are removed and replaced by applicable revisions in work areas in a timely manner.

6B2. A master list or equivalent document control system is established to identify the current revision of instructions, procedures, specifications, drawings, and procurement documents. When such a list is used, it should be updated and distributed to predetermined responsible personnel.

6C1. Procedures are established and described to provide for the preparation of as-built drawings and related documentation in a timely manner to accurately reflect the actual plant design.

Activities related to <u>Control of Purchased Material, Equipment, and Services</u> (17.1.7) are acceptable if:

7A1. Organizational responsibilities are described for the control of purchased material, equipment, and services including interfaces between design, procurement, and QA organizations.

7A2. Verification of suppliers' activities during fabrication, inspection, testing, and shipment of materials, equipment, and components is planned and performed with QA organization participation in accordance with written procedures to assure conformance to the purchase order requirements. These procedures, as applicable to the method of procurement, provide for:

a. Specifying the characteristics or processes to be witnessed, inspected or verified, and accepted; the method of surveillance and the extent of documentation required; and those responsible for implementing these procedures.

b. Audits, surveillance, or inspections which assure that the supplier complies with the quality requirements.

7A3. Selection of suppliers is documented and filed. If an LCVIP letter of confirmation or the "CASE" Register is used to establish the qualifications of the supplier, the documentation should identify the "letter" or "audit" used.

7A4. Procurement of spare or replacement parts for structures, systems, and components important to safety is subject to present QA program controls, to codes and standards, and to technical requirements equal to or better than the original technical requirements, or as required to preclude repetition of defects.

7B1. Receiving inspection is performed to assure:

a. The material, component, or equipment is properly identified and corresponds to the identification on the purchase document and the receiving documentation.

b. Material, components, equipment, and acceptance records satisfy the inspection instructions prior to installation or use.

c. Specified inspection, test and other records, (such as certificates of conformance attesting that the material, components, and equipment conform to specified requirements) are available at the nuclear power plant prior to installation or use.

7B2. Items accepted and released are identified as to their inspection status prior to forwarding them to a controlled storage area or releasing them for installation or further work.

7B3. The supplier furnishes the following records to the purchaser:

a. Documentation that identifies the purchased item and the specific procurement requirements (e.g., codes, standards, and specifications) met by the item.

b. Documentation identifying any procurement requirements that have not been met.

c. A description of those nonconformances from the procurement requirements dispositioned "accept as is" or "repair."

The review and acceptance of these documents should be described in the purchaser's QA program.

7B4. For commercial "off-the-shelf" items where specific quality assurance controls appropriate for nuclear applications cannot be imposed in a practicable manner, special quality verification requirements shall be established and described to provide the necessary assurance of an acceptable item by the purchaser.

7B5. Suppliers' certificates of conformance are periodically evaluated by audits, independent inspections, or tests to assure they are valid and the results documented.

7B6. The description of the control of procurement provisions listed above satisifies the regulatory position in Regulatory Guide 1.38 and Regulatory Guide 1.123.

Activities related to Identification and Control of Materials, Parts, and Components (17.1.8) are acceptable if:

8A. Controls are established and described to identify and control materials (including consumables), parts, and components including partially fabricated subassemblies. The description should include organizational responsibilities.

8B1. Procedures are established which assure that identification is maintained either on the item or on records traceable to the item to preclude use of incorrect or defective items.

8B2. Identification of materials and parts important to the function of structures, systems, and components important to safety can be traced to the appropriate documentation such as drawings, specifications, purchase orders, manufacturing and inspection documents, deviation reports, and physical and chemical mill test reports.

8B3. Correct identification of material, parts, and components is verified and documented prior to release for fabrication, assembling, shipping, and installation.

Activities related to Control of Special Processes (17.1.9) are acceptable if:

9A1. The criteria for determining those processes that are controlled as special processes are described. As complete a listing as possible of special processes, which are generally those processes where direct inspection is impossible or disadvantageous, should be provided. Some examples are welding, heat treating, NDT, and chemical cleaning.

9A2. Organizational responsibilities including those for the QA organization are described for qualification of special processes, equipment, and personnel.

9B1. Procedures, equipment, and personnel associated with special processes are qualified and are in conformance with applicable codes, standards, QA procedures, and specifications. The QA organization is involved in the qualification activities to assure they are satisfactorily performed.

9B2. Procedures are established for recording evidence of acceptable accomplishment of special processes using qualified procedures, equipment, and personnel.

9B3. Qualification records of procedures, equipment, and personnel associated with special processes are established, filed, and kept current.

Activities related to Inspection (17.1.10) are acceptable if:

10A. The scope of the inspection program is described that indicates an effective inspection program has been established. Program procedures provide criteria for determining the accuracy requirements of inspection equipment and criteria for determining when inspections are

required or define how and when inspections are performed. The QA organization participates in the above functions.

10B1. Organizational responsibilities for inspection are described. Individuals performing inspections are other than those who performed or directly supervised the activity being inspected and do not report directly to the immediate supervisors who are responsible for the activity being inspected. If the individuals performing inspections are not part of the QA organization, the inspection procedures, personnel qualification criteria, and independence from undue pressure such as cost and schedule should be reviewed and found acceptable by the QA organization prior to the initiation of the activity.

10B2. A qualification program for inspectors (including NDT personnel) is established and documented, and the qualifications and certifications of inspectors are kept current.

10C1. Inspection procedures, instructions, or checklists provide for the following:

a. Identification of characteristics and activities to be inspected.

b. A description of the method of inspection.

c. Identification of the individuals or groups responsible for performing the inspection operation in accordance with the provisions of item 10B1.

d. Acceptance and rejection criteria.

e. Identification of required procedures, drawings and specifications and revisions.

f. Recording inspector or data recorder and the results of the inspection operation.

g. Specifying necessary measuring and test equipment including accuracy requirements.

10C2. Procedures are established and described to identify, in pertinent documents, mandatory inspection hold points beyond which work may not proceed until inspected by a designated inspector.

10C3. Inspection results are documented, evaluated and their acceptability determined by a responsible individual or group.

Activities related to Test Control (17.1.11) are acceptable if:

11A1. The description of the scope of the test control program indicates an effective test program has been established for tests including proof tests prior to installation and preoperational tests. Program procedures provide criteria for determining the accuracy requirements of test equipment and criteria for determining when a test is required or how and when testing activities are performed.

11B1. Test procedures or instructions provide as required for the following:

a. The requirements and acceptance limits contained in applicable design and procurement documents.

b. Instructions for performing the test.

c. Test prerequisites such as calibrated instrumentation, adequate test equipment and instrumentation including their accuracy requirements, completeness of item to be tested, suitable and controlled environmental conditions, and provisions for data collection and storage.

d. Mandatory inspection hold points for witness by owner, contractor, or inspector (as required).

e. Acceptance and rejection criteria.

f. Methods of documenting or recording test data and results.

g. Provisions for assuring test prerequisites have been met.

11C1. Test results are documented, evaluated, and their acceptability determined by a responsible individual or group.

Activities related to Control of Measuring and Test Equipment (17.1.12) are acceptable if:

12.1 The scope of the program for the control of measuring and test equipment is described and the types of equipment to be controlled are established. This information indicates an effective calibration program has been established.

12.2 QA and other organizations' responsibilities are described for establishing, implementing, and assuring effectiveness of the calibration program.

12.3 Procedures are established and described for calibration (technique and frequency), maintenance, and control of the measuring and test equipment (instruments, tools, gages, fixtures, reference and transfer standards, and nondestructive test equipment) that is used in the measurement, inspection, and monitoring of structures, systems, and components. The review and documented concurrence of these procedures is described and the organization responsible for these functions is identified.

12.4 Measuring and test equipment is identified and traceable to the calibration test data.

12.5 Measuring and test equipment is labeled or tagged or "otherwise controlled" to indicate due date of the next calibration. The method of "otherwise controlled" should be described.

12.6 Measuring and test equipment is calibrated at specified intervals based on the required accuracy, purpose, degree of usage, stability characteristics, and other conditions affecting the measurement.

Calibration of this equipment should be against standards that have an accuracy of at least four times the required accuracy of the equipment being calibrated or, when this is not possible, have an accuracy that assures the equipment being calibrated will be within required tolerance and that the basis of acceptance is documented and authorized by responsible management. The management authorized to perform this function is identified.

12.7 Calibrating standards have greater accuracy than standards being calibrated. Calibrating standards with the same accuracy may be used if it can be shown to be adequate for the requirements and the basis of acceptance is documented and authorized by responsible management. The management authorized to perform this function is identified.

12.8 Reference and transfer standards are traceable to nationally recognized standards; where national standards do not exist, provisions are established to document the basis for calibration.

12.9 Measures are taken and documented to determine the validity of previous inspections performed and the acceptability of items inspected or tested since the last calibration when measuring and test equipment is found to be out of calibration. Inspections or tests are repeated on items determined to be suspect.

Activities related to Handling, Storage, and Shipping (17.1.13) are acceptable if:

13.1 Special handling, preservation, storage, cleaning, packaging, and shipping requirements are established and accomplished by suitably trained individuals in accordance with predetermined work and inspection instructions.

13.2 Procedures are established and described to control the cleaning, handling, storage, packaging, and shipping of materials, components, and systems in accordance with design and procurement requirements to preclude damage, loss, or deterioration by environmental conditions such as temperature or humidity.

13.3 The description of the control of handling, storage, and shipping listed above satisfies the regulatory position in Regulatory Guide 1.38.

Activities related to Inspection, Test, and Operating Status (17.1.14) are acceptable if:

14.1 Procedures are established to indicate the inspection, test, and operating status of structures, systems, and components throughout fabrication, installation, and test.

14.2 Procedures are established and described to control the application and removal of inspection and welding stamps and status indicators such as tags, markings, labels, and stamps.

14.3 Procedures are established and described to control altering the sequence of required tests, inspections, and other operations important to safety. Such actions should be subject to the same controls as the original review and approval.

14.4 The status of nonconforming, inoperative, or malfunctioning structures, systems, and components is documented and identified to prevent inadvertent use. The organization responsible for this function is identified.

Activities related to Nonconforming Materials, Parts, or Components (17.1.15) are acceptable if:

15.1 Procedures are established and described for identification, documentation, segregation, review, disposition, and notification to affected organizations of nonconforming materials, parts, components and as applicable to services (including computer codes) if disposition is other than to scrap. The procedures provide identification of authorized individuals for independent review of nonconformances, including disposition and closeout.

15.2 QA and other organizational responsibilities are described for the definition and implementation of activities related to nonconformance control. This includes identifying those individuals or groups with authority for the disposition of nonconforming items.

15.3 Documentation identifies the nonconforming item; describes the nonconformance, the disposition of the nonconformance, and the inspection requirements; and includes signature approval of the disposition. Nonconformances are corrected or resolved prior to the initiation of the preoperational test program on the item.

15.4 Reworked, repaired, and replacement items are inspected and tested in accordance with the original inspection and test requirements or acceptable alternatives.

15.5 Nonconformance reports are periodically analyzed by the QA organization to show quality trends, and the significant results are reported to upper management for review and assessment.

Activities related to Corrective Action (17.1.16) are acceptable if:

16.1 Procedures are established and described indicating an effective corrective action program has been established. The QA organization reviews and documents concurrence with the procedures.

16.2 Corrective action is documented and initiated following the determination of a condition adverse to quality (such as a nonconformance, failure, malfunction, deficiency, deviation, and defective material and equipment) to preclude recurrence. The QA organization is involved in the documented concurrence of the adequacy of the corrective action.

16.3 Followup action is taken by the QA organization to verify proper implementation of corrective action and to close out the corrective action in a timely manner.

16.4 Significant conditions adverse to quality, the cause of the conditions, and the corrective action taken to preclude repetition are documented and reported to immediate management and upper levels of management for review and assessment.

Activities related to Quality Assurance Records (17.1.17) are acceptable if:

17.1 The scope of the records program is described. QA records include results of reviews, inspections, tests, audits, and material analyses; monitoring of work performance; qualification of personnel, procedures, and equipment; and other documentation such as drawings, specifications, procurement documents, calibration procedures and reports; nonconformance reports; and corrective action reports.

17.2 QA and other organizations are identified and their responsibilities are described for the definition and implementation of activities related to QA records.

17.3 Inspection and test records contain the following where applicable:

a. A description of the type of observation.

b. The date and results of the inspection or test.

c. Information related to conditions adverse to quality.

d. Inspector or data recorder identification.

e. Evidence as to the acceptability of the results.

f. Action taken to resolve any discrepancies noted.

17.4 Suitable facilities for the storage of records are described and satisfy the regulatory position given in Regulatory Guide 1.88 (endorses N45.2.9). Alternatives to the fire protection rated provisions are acceptable if records storage facilities conform to NFPA No. 232 Class 1 for permanent-type records and that the 2-hour fire rating requirement contained in the proposed N45.2.9 standard is met by applicants in any one of the following three ways. Specifically, (1) a 2-hour vault meeting NFPA No. 232; (2) 2-hour rated file containers meeting NFPA No. 232 (Class B); or (3) a 2-hour rated fire resistant file room meeting NFPA No. 232 if the following additional provisions are provided.

1. Early warning fire detection and automatic fire suppression should be provided, with electronic supervision at a constantly attended central station.

2. Records should be stored in fully enclosed metal cabinets. Records should not be permitted on open steel shelving. No storage of records should be permitted on the floor of the facility. Adequate access and aisle ways should be maintained at all times throughout the facility.

3. Work not directly associated with records storage or retrieval should be prohibited within the records storage facility. Examples of such prohibited activities include but are not limited to: records reproduction, film developing, and fabrication of microfiche cards.

4. Smoking and eating/drinking should be prohibited throughout the records storage facility.

5. Ventilation, temperature, and humidity control equipment should be protected inside with standard fire-door dampers where they penetrate fire barriers bounding the storage facility.

17.5 The description of the control of records provisions listed above satisfies the regulatory position of Regulatory Guide 1.88.

Activities related to <u>Audits</u> (17.1.18) are acceptable if:

18A1. Audits to assure that procedures and activities comply with the overall QA program are performed by:

a. The QA organization to provide a comprehensive independent verification and evaluation of quality-related procedures and activities.

b. The applicant (and principal contractors) to verify and evaluate the QA programs, procedures, and activities of suppliers.

18A2. An audit plan is prepared identifying audits to be performed, their frequencies, and schedules. Audits should be regularly scheduled based upon the status and safety importance of the activities being performed and are initiated early enough to assure effective QA during design, procurement, manufacturing, construction, installation, inspection, and testing.

18A3. Audits include an objective evaluation of quality-related practices, procedures, instructions; activities and items; and review of documents and records to ensure that the QA program is effective and properly implemented.

18A4. Provisions are established requiring that audits be performed in all areas where the requirements of Appendix B to 10 CFR Part 50 are applicable. Areas which are often neglected but should be included are activities associated with:

a. The determination of site features which affect plant safety (e.g., core sampling, site and foundation preparation, and methodology). (PSAR only).

b. The preparation, review, approval, and control of early procurements. (PSAR only).

c. Indoctrination and training programs.

c. Interface control among the applicant and the principal contractors.

e. Corrective action, calibration, and nonconformance control systems.

f. SAR and SSAR commitments.

g. Activities associated with computer codes.

1881. Audit data are analyzed by the QA organization and the resulting reports indicating any quality problems and the effectiveness of the QA program, including the need for reaudit of deficient areas, are reported to management for review and assessment.

1882. Audits are performed in accordance with pre-established written procedures or checklists and conducted by trained personnel having no direct responsibilities in the areas being audited.

1883. The description of the conduct of audit provisions satisfies the regulatory position in Regulatory Guides 1.144 and 1.146.

III. REVIEW PROCEDURES

Each element of the QA program description will be reviewed against the acceptance criteria described in subsection II, including the regulations, Regulatory Guides, and Branch Technical Position listed in subsection V. QAB will interface with the secondary review branches to assure that they have documented to the QAB by memo the acceptability of the identification of structures, systems, and components covered by the QA program (Q-List). QAB will process the necessary requests for additional information to the applicant and coordinate the response with the appropriate branches for acceptance. Changes to the QA program will be evaluated to assure at a minimum that such changes have not degraded the previously approved program. Consideration should be given to the current regulatory position in the area of the change in determining acceptability of the change. The reviewer's judgment during the review is to be based on an assessment of the material presented, the similarity of the material to that recently reviewed on other plants, and whether items of special safety significance are involved. Any exceptions or alternatives to this SRP section, including the regulations and regulatory positions presented in the Regulatory Guides in subsection V, will be carefully reviewed to assure that they are clearly defined and that an adequate basis exists for acceptance.

The acceptability of the QA program is determined by the following review procedures:

1. The QA program description is reviewed in detail to determine if each of the criteria of 10 CFR Part 50, Appendix B has been acceptably addressed and if there is an adequate commitment to comply with the regulations and regulatory positions in the appropriate issue of the Regulatory Guides in subsection V, as identified by number, title, revision or date. The QA program description is also reviewed to assure that the applicant's approach to meeting the QA criteria and commitments is acceptable.

2. The measures described to implement 10 CFR Part 50, Appendix B are evaluated for:

   a. Technical acceptability (i.e., do they meet the Regulations and Regulatory Guides?)

b. Workability (i.e., do they seem to fit into an overall plan of action that can be implemented?)

c. Management support (i.e., do QA program measures have adequate review, approval, and endorsement of management?)

This evaluation is based primarily on the acceptance criteria contained in subsection II.

3. The duties, responsibility, and authority of personnel performing QA functions are reviewed to assure they provide sufficient independence to effectively perform these functions.

4. Through review of information provided, meetings with the applicant, by review of the acceptability of QA program and plant activities including performance and capability of personnel, and by review of the Office of Inspection and Enforcement position statement and inspection reports, a judgment is made of the applicant's capability to carry out its QA responsibilities.

5. Satisfaction with program commitments and descriptions of how the commitments will be met, organizational arrangements, and capabilities to fulfill QA requirements should lead to the conclusion of acceptability, as described in subsection IV.

IV. EVALUATION FINDINGS

The reviewer verifies that sufficient information has been provided and that his review is sufficiently complete and adequate to support conclusions of the following type to be included in the staff's Safety Evaluation Report:

Based on our detailed review and evaluation of the QA program description contained in the (topical report or SAR) for (nuclear facility), we conclude that:

1. The organizations and persons performing QA functions have the required independence and authority to effectively carry out the QA program without undue influence from those directly responsible for costs and schedules.

2. The QA program describes requirements, procedures, and controls that, when properly implemented, comply with the requirements of Appendix B to 10 CFR Part 50 with the requirements of 10 CFR Part 50, §50.55a and §55(e); with the criteria contained in SRP Section 17.1; and with the regulatory positions presented in the following Regulatory Guides.

Reg. Guide/ANSI Std.	Title	Revision or Date

A brief description of the applicant's QA program is provided highlighting the more important aspects of the program.

3. The QA program covers activities affecting structures, systems, and components important to safety as identified in the PSAR.

Accordingly, the staff concludes that the applicant's description of the QA program is in compliance with applicable NRC regulations and industry standards and can be implemented for the (specify) phases of (specify application).

V. IMPLEMENTATION

The following is intended to provide guidance to applicants and licensees regarding the NRC staff's plan for using this SRP Section.

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 will be used by the staff in its evaluation of conformance with Commission regulations.

Implementation schedules for conformance to parts of the method discussed herein are contained in the referenced guides and NUREGs.

VI. REFERENCES

1. 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants."

2. 10 CFR Part 50, §50.55a, "Codes and Standards."

3. 10 CFR Part 50, §50.55(e), "Conditions of Construction Permits" (reporting significant QA deficiencies).

4. 10 CFR Part 50, §50.34(a.7), "Contents of Application; Technical Information" (Preliminary Safety Analysis QA program description).

5. 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants."

6. Regulatory Guide 1.8, "Personnel Selection and Training" (endorses ANSI/ANS 3.1).

7. Regulatory Guide 1.26, "Quality Group Classification, and Standards for Water, Steam, and Radioactive Waste Containing Components of Nuclear Power Plants."

8. Regulatory Guide 1.28, "Quality Assurance Program Requirements (Design and Construction)" (endorses N45.2).

9. Regulatory Guide 1.29, "Seismic Design Classification."

10. Regulatory Guide 1.30, "Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electric Equipment" (endorses N45.2.4).

11. Regulatory Guide 1.37, "Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants" (endorses N45.2.1).

12. Regulatory Guide 1.38, "Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants" (endorses N45.2.2).

13. Regulatory Guide 1.39, "Housekeeping Requirements for Water-Cooled Nuclear Power Plants" (endorses N45.2.3).

14. Regulatory Guide 1.58, "Qualification of Nuclear Power Plant Inspection, Examination, and Testing Personnel" (endorses N45.2.6).

15. Regulatory Guide 1.64, "Quality Assurance Requirements for the Design of Nuclear Power Plants" (endorses N45.2.11).

16. Regulatory Guide 1.74, "Quality Assurance Terms and Definitions" (endorses N45.2.10).

17. Regulatory Guide 1.88, "Collection, Storage, and Maintenance of Nuclear Power Plant Quality Assurance Records" (endorses N45.2.9).

18. Regulatory Guide 1.94, "Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants" (endorses N45.2.5).

19. Regulatory Guide 1.116, "Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems" (endorses N45.2.8).

20. Regulatory Guide 1.123, "Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants" (endorses N45.2.13).

21. Regulatory Guide 1.144, "Auditing of Quality Assurance Programs for Nuclear Power Plants" (endorses N45.2.12).

22. Regulatory Guide 1.146, "Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants" (endorses N45.2.23).

23. Branch Technical Position (BTP) ASB 9.5-1 (attached to SRP Section 9.5.1).

U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

OFFICE OF NUCLEAR REACTOR REGULATION

17.2 QUALITY ASSURANCE DURING THE OPERATIONS PHASE

REVIEW RESPONSIBILITIES

Primary - Quality Assurance Branch (QAB)

Secondary - Mechanical Engineering Branch
Instrumentation & Control Systems Branch
Power Systems Branch
Accident Evaluation Branch
Radiological Assessment Branch
Hydrologic & Geotechnical Engineering Branch
Containment Systems Branch

I. AREAS OF REVIEW

QAB reviews and evaluates the applicant's operational quality assurance (QA) program as described in the FSAR. The review at the operating license stage addresses both the "offsite" and "onsite" QA controls to be applied to those activities that may affect the quality of items important to safety during the operation, maintenance, and modification of a nuclear power plant. The review covers the QA controls to be applied to those activities (e.g., designing, constructing, purchasing, fabricating, handling, shipping, storing, cleaning, erecting, installing, maintaining, modifying, operating, inspecting, and testing) that may affect the quality of structures, systems, and components important to safety. The secondary review branches review the listing of structures, systems, and components (QA list) covered by the QA program for their areas of review responsibility in accordance with 2A1 of this section of the Standard Review Plan and documents the acceptability of the listing including any items that should be added or clarified by memo to the QAB. The review by MEB in this regard also addresses the areas of review responsibility normally assigned to ASB, RSB, CEB, PSB (except electrical), and SEB.

The review extends to the determination of how the applicable requirements of the 18 criteria of Appendix B to 10 CFR Part 50 are satisfied by the proposed QA program.

USNRC STANDARD REVIEW PLAN

Standard review plans are prepared for the guidance of the Office of Nuclear Reactor Regulation staff responsible for the review of applications to construct and operate nuclear power plants. These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Standard review plans are not substitutes for regulatory guides or the Commission's regulations and compliance with them is not required. The standard review plan sections are keyed to the Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants. Not all sections of the Standard Format have a corresponding review plan.

Published standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission

Where an NRC-accepted QA topical report is referenced in the application, the referenced QA program is not re-reviewed except for conformance to the applicable staff positions in this SRP section and the Regulatory Guides in effect at the time of docketing the application.

The review will not involve an evaluation of the QA program for the design and construction phase and, therefore, the QAP description for design and construction should not be addressed in the FSAR except for a commitment for continued implementation of the PSAR QA program for the remaining design and construction activities and the preoperational test program or referenced as applicable for repair and modifications only during the operations phase. However, as desired, changes to the QA program for design and construction may be presented in the FSAR for staff review and approval. Staff review will only address the program changes.

The areas of review for this SRP section are the same as those described in SRP Section 17.1 except:

1. Organization (item 1) delete from part A: "including the applicant's organization and principal contractors (architect engineer, nuclear steam supply system vendor, constructor, and construction manager when other than the constructor)."

2. Audits (item 18) add a part C: "Provisions for the audit of operating activities important to safety independent of the operating organization."

II. ACCEPTANCE CRITERIA

The applicant must establish a QA program for the operations phase, including activities such as operation, maintenance, and modification of the nuclear power plant, in accordance with Appendix B to 10 CFR Part 50, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants." The QA program description presented in the FSAR must discuss how each criterion of Appendix B will be met. The acceptance criteria used by the QAB to evaluate the program are listed below. The acceptance criteria include commitments to comply with the regulatory positions presented in the appropriate issue of the Regulatory Guides including the requirements of ANSI Standard N45.2.12 and the Branch Technical Position listed in subsection V of SRP Section 17.1. Thus, these commitments constitute an integral part of the QA program description and requirements. Exceptions and alternatives to these acceptance criteria may be taken by applicants provided adequate justification is given; and the QAB review allows for considerable flexibility in defining methods and controls for satisfying pertinent regulations. When the QA program description meets the acceptance criteria of this SRP section or provides acceptable exceptions or alternatives, the program is considered to be in compliance with pertinent NRC regulations. The review will ascertain that the commitments and the description of how the commitments are implemented, to the extent necessary, are objective and stated in inspectable terms.

The Organization (SRP Section 17.2.1) elements responsible for the QA program are acceptable if:

1. The criteria described in 17.1.1* are satisfied except for:

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*Refers to the acceptance criteria given in subsection II of SRP Section 17.1.

a. Item 1A4.

b. The organizational elements within the parenthesis in item 1A5 be expanded to include operations and maintenance.

c. The requirements that principal contractors describe QA responsibilities be deleted in Item 1A6.

d. The requirements that a QA position be identified for principal contractors as described in Item 1B1, be deleted.

e. "The person at the construction site responsible for directing and managing the site QA program..." described in Item IC3, be changed to "The person...responsible for...the onsite QA program," and continue on with remaining sentence starting with "has appropriate organizational...."

The Quality Assurance Program (SRP Section 17.2.2) description is acceptable if:

1. The criteria described in 17.1.2 are satisfied except for:

   a. Item 2A1b.

   b. The requirement for the principal contractors to provide a commitment to comply with the regulations and regulatory positions in the Regulatory Guides addressed in Item 2B3.

   c. Item 2C2.

   d. Item 2C3.

2. Provisions are established for assuring the QA program for operations is implemented at least 90 days prior to fuel loading.

3. Confirmation is provided to commit to continued implementation of the PSAR QA program for the remaining design and construction activities and the preoperational test program or an acceptable alternative is provided.

Activities related to Design Control (SRP Section 17.2.3) are acceptable if:

1. The criteria described in 17.1.3 are satisfied.

2. Measures are provided to assure that responsible plant personnel are made aware of design changes/modifications which may affect the performance of their duties.

Activities related to Procurement Document Control (17.2.4) are acceptable if:

1. The criteria described in 17.1.4 are satisfied.

Activities related to Instructions, Procedures, and Drawings (17.2.5) are acceptable if:

1. The criteria described in 17.1.5 are satisfied.

Activities related to Document Control (17.2.6) are acceptable if:

1. The criteria described in 17.1.6 are satisfied.

2. Maintenance, modification and inspection procedures are reviewed by qualified personnel knowledgeable in QA disciplines (normally the QA organization) to determine:

   a. The need for inspection, identification of inspection personnel, and documentation of inspection results.

   b. That the necessary inspection requirements, methods, and acceptance criteria have been identified.

Activities related to Control of Purchased Material, Equipment, and Services (17.2.7) are acceptable if:

1. The criteria described in 17.1.7 are satisfied.

Activities related to Identification and Control of Materials, Parts, and Components (17.2.8) are acceptable if:

1. The criteria described in 17.1.8 are satisfied.

Activities related to the Control of Special Processes (17.2.9) are acceptable if:

1. The criteria described in 17.1.9 are satisfied.

Activities related to Inspection (17.2.10) are acceptable if:

1. The criteria described in 17.1.10 are satisfied.

2. When inspections associated with normal operations of the plant (such as routine maintenance, surveillance, and tests) are performed by individuals other than those who performed or directly supervised the work, but are within the same group, the following controls are met:

   a. The quality of the work can be demonstrated through a functional test when the activity involves breaching a pressure retaining item.

   b. The qualification criteria for inspection personnel are reviewed and found acceptable by the QA organization prior to initiating the inspection.

Activities related to Test Control (17.2.11) are acceptable if:

1. The criteria described in 17.1.11 are satisfied.

Activities related to Control of Measuring and Test Equipment (17.2.12) are acceptable if:

1. The criteria described in 17.1.12 are satisfied.

Activities related to Handling, Storage, and Shipping (17.2.13) are acceptable if:

1. The criteria described in 17.1.13 are satisfied.

2. Provisions are described for the storage of chemicals, reagents (including control of shelf life), lubricants, and other consumable materials.

Activities related to Inspection, Test, and Operating Status (17.2.14) are acceptable if:

1. The criteria described in 17.1.14 are satisfied.

Activities related to Nonconforming Materials, Parts, or Components (17.2.15) are acceptable if:

1. The criteria described in 17.1.15 are satisfied.

Activities related to Corrective Action (17.2.16) are acceptable if:

1. The criteria described in 17.1.16 are satisfied.

Activities related to Quality Assurance Records (17.2.17) are acceptable if:

1. The criteria described in 17.1.17 are satisfied.

2. QA records include operating logs, maintenance and modification procedures, and related inspection results, reportable occurrences, and other records required by Technical Specifications.

Activities related to Audits (17.2.18) are acceptable if:

1. The criteria described in 17.1.18 are satisfied.

2. Where the "onsite" QA organization does not report to the "offsite" organization:

   a. The "offsite" QA organization conducts audits sufficient to verify adequacy of activities conducted by the "onsite" QA organization.

   b. The "offsite" QA organization reviews and concurs in the schedule and scope of audits performed by the "onsite" QA organization.

   c. Results of audits performed by the "onsite" QA organization are provided to the "offsite" QA organization for review and assessment.

III. REVIEW PROCEDURES

Same as SRP Section 17.1 except that the Office of Inspection & Enforcement (I&E) does not provide a position statement to QAB relative to their assessment of the QA program implementation for SER input. I&E provides this assessment to the Licensing Project Manager. QAB reviews a description of the I&E summary

of completed QA program activities to further determine that the facility has been designed and constructed in accordance with PSAR program commitments.

IV. EVALUATION FINDINGS

Same as SRP Section 17.1.

V. IMPLEMENTATION

Same as SRP Section 17.1.

VI. REFERENCES

Same as SRP Section 17.1 except replace item 8, Regulatory Guide 1.28, "Quality Assurance Program Requirements (Design and Construction)" (endorses N45.2) with Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation)" (endorses N18.7); replace 10 CFR Part 50, §50.34(a.7) with 10 CFR Part 50, §50.34 (b.6ii), "Final Safety Analysis Report"; and delete 10 CFR Part 50, §50.55(e), "Conditions of Construction Permits."