Quality Assurance Program Description

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Quality Assurance Program Description for The Design, Construction, and Operation of TVA Nuclear Power Plant

Effective Page Listing

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Quality Assurance Program Description
for the Design, Construction, and Operation
of
TVA Nuclear Power Plants

(SAR Section 17.0, PSAR Section 17.1A, and FSAR Section 17.2)

ABSTRACT

This topical report presents the Tennessee Valley Authority (TVA) Quality Assurance Program developed for the planning, design, construction, operation, and maintenance of TVA nuclear plants. When referenced in an SAR, the report is intended to be used for sections 17.0, 17.1A, and 17.2 of TVA's Safety Analysis Reports, Chapter, 17, 'Quality Assurance,' in accordance with the NRC's Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants-LWR Edition, Rev. 2 (September 1975). 7

The introductory sections describe the purpose of this report and reference statements of policy.

Section 17.0 describes TVA's organization and organization charts are included.

Section 17.1 describes the program for quality assurance during planning, design, and construction of nuclear power plants. A description of the purpose and scope of key TVA quality assurance procedures with a cross-index relating them to the Quality Assurance Criteria of 10 CFR 50, Appendix B, are included. 8

Section 17.2 describes the quality assurance program for quality assurance during plant operation. A description of the purpose and scope of the key TVA procedures with a cross-index relating them to 10 CFR 50, Appendix B, criteria and applicable TVA procedures is included.

TVA's QA Program meets the requirements of 10 CFR 50, Appendix B. This topical report is intended to be a comprehensive description of the program and will be amended as necessary to keep it up to date. 7

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LIST OF ABBREVIATIONS

The following abbreviations are used in this report:

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
CASE	Coordinating Agency for Supplier Evaluation
CEO	Construction Engineering Organization
CEP	Construction Engineering Procedures
CFR	Code of Federal Regulations
CLS	Central Laboratories Services
CONST	Office of Construction
CONST-QAP	Office of Construction Quality Assurance Procedure
CONST-QAPP	Office of Comstruction Quality Assurance Program Policy
CONST-QCP	Office of Construction Quality Control Procedure
CSSC	Critical Structures, Systems, and Components
DCR	Design Change Request
DDR	Design Deficiency Report
DQA	Division of Quality Assurance
ECN	Engineering Change Notice
EN DES-EP	Office of Engineering's Engineering Procedure
FCC	Functional Configuration Control
FCR	Field Change Request
FSAR	Final Safety Analysis Report
GSG	Geologic Services Group
HTN	Hartsville Nuclear Plant
ID-QAP	Interdivisional Quality Assurance Procedure
IQT	Indefinite Quantity Term
MCS	Maintenance Coordination Staff
MEDS	Management and Engineering Data System
MIQP	Manufacturing and Installation Quality Plan
NCR	Nonconformance Report
NDE	Nondestructive Examination
NEG	Nuclear Systems Engineering Group
NFEB	Nuclear Fuels and Engineering Branch
NLS	Nuclear Licensing Section
NRC	Nuclear Regulatory Commission
NSB	Nuclear Service Branch
NSGPO	Nuclear Student Generating Plant Operator
NSSS	Nuclear Steam Supply System
NUC PR	Office of Nuclear Power
OIE	Office of Inspection and Enforcement
ONRR	Office of Nuclear Reactor Regulation

LIST OF ABBREVIATIONS (Continued)

OQAM	Operational Quality Assurance Manual
PBN	Phipps Bend Nuclear Plant
PMO	Project Management Organization
PORC	Plant Operations Review Committee
PSAR	Preliminary Safety Analysis Report
PSO	Division of Power System Operations
PSS	Power Service Shops
PURCH	Division of Purchasing
QA	Quality Assurance
QAB	Quality Assurance Branch
QC	Quality Control
QCI	Quality Control Instructions
QCRU	Quality Control and Records Unit
QEB	Quality Engineering Branch
QMO	Quality Manager Organization
RG	Regulatory Guide
RPV	Reactor Pressure Vessel
RS and PMI	Receiving, Storage, and Preventive Maintenance Instructions
SAR	Safety Analysis Report
SCCDL	System Configuration Control Drawing List
TVA	Tennessee Valley Authority
UNID	Unique Identification System

INTRODUCTION

INTRODUCTION

Nuclear power plants include structures, systems, and components that prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public. These are referred to as 'safety-related;' structures, systems, and components in Section 17.1 and 'critical' structures, systems, and components (CSCC) in Section 17.2. The TVA Quality Assurance Program to be applied to the design, procurement, fabrication, construction, testing, operation, and maintenance of those structures, systems, and components is described in this report. This program description will be referenced in whole or in part in the SAR's of plants to which it is applicable.

Quality assurance comprises all those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service. Quality assurance includes quality control which comprises those quality assurance actions related to the physical characteristics of a material, structure, component, or system which provide a means to control the quality of the material, structure, component, or system to predetermined requirements (10 CFR 50 Appendix B). It is recognized that all activities or items may not require the same degree of control over quality. Expressions such as 'proper' or 'as required' are used to indicate that a determination shall be made as to the degree of control or quality based on the importance of the activity or item to plant safety. 7

This report presents the comprehensive TVA nuclear quality assurance program developed for the planning, design, procurement, construction, testing, operation, and maintenance of TVA nuclear plants. The architect-engineering design, plant construction, and plant operation are to be performed by the Tennessee Valley Authority. Thus TVA has the primary role, assisted by the supplier of the nuclear steam supply system (NSSS) and nuclear fuel, in providing assurance that the plant has been designed and constructed to adequate standards of quality. TVA has the responsibility for operating the plant to assure that the health and safety of the public are not compromised. 8 7

The management policies and requirements for the TVA nuclear quality assurance program are established and maintained by the Division of Quality Assurance. These management policies and requirements provide the controls that must be applied to the quality-related activities performed by and for the agency to assure implementation of our commitments. 8 7

The performing organizations prepare and maintain implementing policies, procedures, and instructions to assure implementation of TVA management policies and requirements and resultantly our commitments. These policies, procedures, and instructions define the plans and instructions necessary for performance of the organizations assigned quality-related activities. 7

This report is written in the format of a safety analysis report (SAR) Chapter 17, "Quality Assurance," in accordance with the NRC's Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants-LWR Edition, Rev. 2 (September 1975).

TVA-TR75-1A is referenced in a number of our license applications as Chapter 17 of the Safety Analysis Report. We will keep the NRC informed of changes to our quality assurance organization and/or program in accordance with 10 CFR 50.54 and 50.55.

The functions of the organizations participating in the quality assurance program are described in Section 17.0. The quality assurance programs for TVA design and construction activities are defined under Section 17.1. This program is supplemented by the quality assurance program for an individual plant's NSSS supplier which is referenced under 17.1B of the SAR for that plant. If an outside architect-engineer is involved in portions of the work, the architect-engineer's quality assurance program will be discussed in another part of the SAR. The quality assurance program for operational activities is defined under Section 17.2. The quality assurance program for nuclear fuel is included in the scope of the quality assurance program for operational activities described in Section 17.2. 7

17.0

TVA ORGANIZATIONS PARTICIPATING IN THE QUALITY ASSURANCE PROGRAM

17.0.1 General

This section describes the function of the principal TVA organizations participating in the nuclear quality assurance (QA) program. 7

Policy

The Manager of Power and Engineering has designated the Office of Nuclear Power (NUC PR) responsibility and authority to act as the ultimate owner-operator for TVA nuclear plants. Responsibility and authority for developing and maintaining the policy, interpretations, and requirements of TVA's QA program applicable to nuclear plant design, construction, and operational phase activities has been delegated to the Division of Quality Assurance (DQA) in the Office of Nuclear Power (NUC PR). TVA's nuclear QA program as described in Section 17.1 applies to design and construction activities and Section 17.2 applies to operational phase activities. On unlicensed nuclear units the Manager of Power and Engineering has established a Project Management Organization (PMO) that is responsible and accountable for the overall project. The Office of Engineering and the Office of Construction provide architect/engineer and construction services for NUC PR and the PMO. During the 8
construction phase, NUC PR provides operational support services to the PMO. Other organizations within TVA that support the nuclear program will function as service organizations to NUC PR and the PMO as appropriate. Any conflict between TVA organizations related to TVA's nuclear QA program will be resolved by the Director of DQA. Where TVA has delegated responsibility for implementation of parts of the nuclear QA program to contractors, TVA retains responsibility for adequacy of the overall program. The overall relationship among TVA's principal organizational elements for its nuclear facilities is shown in Figure 17A-1, Appendix A.

The Manager of Power and Engineering is responsible for establishing and ensuring effective execution of an overall, integrated program of plans and actions to assure that quality is achieved in TVA performance and is accountable to the General Manager and Board of Directors for its adequacy and effectiveness. He may further delegate responsibility and authority for execution of any part of the program but retains overall responsibility for its adequacy and effectiveness.

17.0.2 Office of Nuclear Power

The Office of Nuclear Power is responsible for the safe operation of all nuclear plants and for compliance with regulatory requirements for licensed units. The office plans and manages the nuclear energy supply programs to meet the requirements of the power program consistent with environmental, economic, safety, and quality objectives at the lowest possible cost. It develops or approves all plans that affect the nuclear power program interests and recommends such plans to the Manager of Power and Engineering. The Office of Nuclear Power organization is shown in Figure 17A-2, Appendix A.

Manager of Nuclear Power

The Manager of Nuclear Power directs and coordinates the work of the Office of Nuclear Power and is assisted by the Director of Quality Assurance, the Director of Nuclear Services, and a Site Director at each nuclear plant. 8

Nuclear Safety Staff

The Nuclear Safety Staff (NSS) reviews nuclear safety-related activities, programs, and events, including those required by plant technical specifications, to independently evaluate the safety of each of TVA's licensed nuclear plants. Audits of activities identified in the plant technical specifications are performed under the cognizance of the NSS. The NSS advises the Manager of NUC PR on the nuclear safety significance of these reviews and audits and on the adequacy and implementation of TVA nuclear safety policies and programs.

17.0.2.1 Division of Quality Assurance

The Division of Quality Assurance (DQA) is responsible for developing and maintaining a nuclear quality assurance program for the design, construction, and operation of TVA nuclear facilities which meets TVA policy and regulatory requirements. Functions performed to meet this responsibility include maintenance of this quality assurance topical report, which delineates TVA's nuclear quality assurance program commitments to the NRC; development and maintenance of the upper-tier quality program policies and requirements for nuclear activities including design, construction, and operation; definition of policy and requirements interpretations; implementation of quality engineering and quality control, surveillance, inspection, and verification activities in support of the Site Directors who are ultimately responsible for quality at the operating nuclear plants; and definition and implementation of a comprehensive audit program in compliance with nuclear regulatory requirements covering operation, modifications, support activities, and suppliers and an overview audit program of design and construction. The Division of Quality Assurance organization is shown on Figure 17A-3, Appendix A.

Director of Quality Assurance

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The Director of Quality Assurance administers the work of the division and is assisted by the Assistant Director; the Operations Quality Assurance Manager; the Plant Quality Assurance Staff Supervisor at each site; the Chief, Quality Systems Branch; the Chief, Quality Audits Branch; and the Chief, Procurement Evaluation Branch.

The Assistant Director of Quality Assurance assists the director in managing the division and directing the work of division managers in the development and implementation of programs which carry out division responsibilities.

17.0.2.1.1 Quality Audits Branch

The Quality Audits Branch is responsible for the planning, conducting, reporting, and followup to assure corrective action of audits of the nuclear power quality assurance program. The audit program is in compliance with requirements of the plant technical specifications and commitments of this topical report. For activities performed by other TVA organizations or suppliers of onsite services where interfaces exist, audit requirements may be satisfied through an overview of or participation in their internal audit program, including audits of their suppliers.

17.0.2.1.2 Procurement Evaluation Branch

The Procurement Evaluation Branch is responsible for developing and maintaining the Acceptable Suppliers List for nuclear procurements for design, construction, and operation phase activities. It performs supplier evaluations and audits to verify the acceptability of suppliers' QA programs, develops effective systems for implementing procurement-related QA requirements, provides assistance in resolving procurement-related quality assurance problems, and performs onsite procurement-related audits. It reviews the quality assurance programs of TVA organizations which support the Office of Nuclear Power, audits those organizations, and performs overview audits of design and construction activities to ensure effective compliance with Section 17.1 of this topical report and TVA policies.

17.0.2.1.3 Operations QA Manager

The Operations Quality Assurance Manager establishes and maintains a Plant Quality Assurance Staff at each operating plant to perform the quality engineering, quality control, and surveillance functions. The Supervisor, Plant Quality Assurance Staff, receives functional supervision from the Site Director but reports administratively to the Operations Quality Assurance Manager. Duties and responsibilities of the Plant Quality Assurance Staff include: 8

1. Assisting plant management in developing, planning, initiating, and directing a detailed nuclear plant quality assurance/quality control program which meets requirements.

2. Performing quality engineering functions relative to plant operations and providing verification of those activities including quality control inspections

3. Evaluating the effectiveness of the nuclear quality assurance program and making recommendations to plant management regarding its implementation.

4. Verifying that plant instructions contain applicable quality assurance requirements and that employees are following the approved instructions.

5. Reviewing and recommending approval of plant instructions concerning the CSSC and verifying compliance with quality assurance requirements for the maintenance, repair, refueling, operation, or modification work fails to comply with approved specifications and plans.

6. Certifying plant inspectors (or verifying that they are certified by other quality assurance organizations) and verifying qualifications of other personnel performing quality control functions.

7. Developing and implementing a quality control inspection program covering modifications, maintenance, repairs, and testing of CSSC items, and for reviewing plant activities and keeping plant management advised of any known failure of plant equipment to meet technical specification requirements or other nonconforming aspects of operations.

8. The Plant QA Staff Supervisor is a member of the Plant Operations Review Committee (PORC).

9. When quality assurance problems occur, the Plant QA Staff has the responsibility and authority to take the necessary corrective action, including termination of an activity through line management, when manufacturing, maintenance, repair, refueling, operation, or modification work fails to comply with approved specifications and plans. 8

17.0.2.1.4 Quality Systems Branch

The Quality Systems Branch is responsible for developing and maintaining upper-tier nuclear quality assurance program documents and for providing quality engineering services to the Office of Nuclear Power. Specific duties include:

1. Developing and maintaining the nuclear quality assurance program which establishes and defines policy, interpretations, and requirements.

2. Maintaining this quality assurance topical report.

3. Providing the quality engineering, quality control, and surveillance functions for the Division of Nuclear Services.

4. Performing ongoing monitoring of quality performance in NUC PR.

5. Providing quality analysts to assist line managers in resolution of problems associated with implementation of quality assurance program requirements.

17.0.2.2 Director of Nuclear Services

The Director of Nuclear Services provides policy direction and assistance necessary for essential standardization in practices and procedures among operating plants and establishes maintenance and technical standards which incorporates regulatory requirements. He provides capability for monitoring and evaluating performance of equipment and personnel for the Manager of Nuclear Power. He is assisted by the Managers of Maintenance and Engineering, Licensing Staff, Emergency Preparedness and Protection Branch, Nuclear Training Branch, and Radiological Health Staff. The Division of Nuclear Services organization is shown on Figure 17A-4, Appendix A. 8

17.0.2.2.1 Licensing Staff

The Licensing Staff has the following functions and responsibilities:

1. Obtains construction permits, nuclear material and fuel licenses, reload licenses, special project licenses, and operating licenses for nuclear facilities.

2. Coordinates the preparation and handles the distribution of those licensing documents supporting the license applications described in item 1, including safety analysis reports, technical specifications, license applications and amendments, topical reports, etc. 7

3. Provides engineering support in the evaluation of industry experience review items and new or revised regulations for plant operations and environmental issues.

4. Provides the Office of Nuclear Power with a regulatory commitment tracking and closure system to ensure TVA has fully met its responsibilities to regulatory agencies. 8

17.0.2.2.2 Radiological Health Staff

The Radiological Health Staff plans and develops policy for radiation protection and control programs for TVA activities where radiation and radioactive materials are involved. They define the program for personnel dosimetry, define and conduct environmental radiological dose assessments in the event of a nuclear accident, and provide centralized laboratory services in support of environmental radioactivity monitoring.

17.0.2.2.3 Emergency Peparedness and Protection Branch

The Emergency Preparedness and Protection Branch is responsible for developing and maintaining nuclear power protection programs and policies, including emergency planning, industrial safety, nuclear security, nonradiological environmental protection, health physics, and risk management. The branch develops and coordinates the implementation of the TVA Radiological Emergency Plan. It also provides plans and directs support for the health physics operational activities, including dosimetry. In carrying out these responsibilities, these organizations verify that NUC PR comply with regulatory and TVA requirements and policy.

17.0.2.2.4 Nuclear Training Branch 8

The Nuclear Training Branch is responsible for the development, implementation, and administration of NUC PR training activities. The branch administers the nuclear student generating plant operator (NSGPO) training program, nuclear operator licensing training, QA/QC training, NDE training and certification, and other technical training programs. The branch is responsible for the operation and maintenance of the Power Operations Training Center.

17.0.2.2.5 Maintenance and Engineering Manager

The Manager, Maintenance and Engineering, is responsible for developing and maintaining progams and standards and providing direct technical support to the nuclear plants in the areas of maintenance and engineering, including mechanical engineering, electrical, instrumentation, and controls engineering, fuel management, and core design. He supervises the Mechanical, Nuclear Fuels and Engineering, and Electrical and Instrument and Controls Branches, and project managers as designated.

The Mechanical Branch is responsible for providing programs, standards, and direct engineering assistance to the nuclear plants for maintenance and engineering activities on safety-related components and for structures, systems, fire protection, in-service inspection, chemical and chemical support, radioactive waste, metallurgy, and containment testing activities. It develops maintenance and technical standards and procedures for this equipment as required.

The Electrical and Instrument and Controls Branch is responsible for providing programs, standards, and direct engineering assistance to the nuclear plants for maintenance and engineering activities on safety-related components and for electrical and instrument and controls equipment, computers, communications, and vibrations and diagnostic activities. It develops maintenance and technical standards and procedures for this equipment as required.

The Nuclear Fuels and Engineering Branch is responsible for providing programs, standards, and direct engineering support to the nuclear plants for reactor analysis, core operations, and fuel engineering support. It plans and implements nuclear fuel cycle design and supply activities, determines detailed reactor fuel supply requirements, projects fuel cycle costs, and develops nuclear fuel economic management and supply programs. It performs the audit and surveillance of nuclear fuel suppliers under the cognizance of the Quality Audits Branch. 8

17.0.2.3 Site Director

The Site Director is responsible and accountable for activities at the site for licensed nuclear units, including operations, modifications, support, and engineering services. The Site Director manages activities associated with the nuclear plants and has the responsibility for determining the nature, extent, and source of offsite support services required. He is responsible for the quality of work activities on licensed units. He is assisted by the Plant Manager; the Manager, Modifications; the Manager, Site Services; and the Manager, Design Services.

17.0.2.3.1 Plant Manager

The primary responsibility and authority for reactor operation and safety at each plant is vested in the Plant Manager. He verifies that established acceptance criteria are satisfied before accepting plant systems and components for operation. He also verifies that modifications or revisions made subsequent to the original design and construction of the project are authorized and carried out in accordance with procedures and instructions and are reflected in the as-built drawings and

specifications and that objectives and performance defined during the design and construction phase are not degraded during subsequent phases of the project. Through assignments to his section supervisors, he ensures that plant instructions are prepared in accordance with the quality assurance program, that work is performed in accordance with these instructions, and that results are documented and proper records maintained. He is also responsible for the adequacy and completeness of the operating logs and the maintenance logs, and the training and qualification of plant personnel.

The Plant Operations Review Committee serves in an advisory capacity to the Plant Manager in matters related to safety in plant operation in accordance with the plant technical specifications.

The Plant Compliance Section is responsible for implementation of a commitment tracking program. This program provides for tracking of corrective actions promised in response to inspections and audits and for tracking of commitments to regulatory agencies.

Plant Operations includes the plant sections that report to the Plant Manager. This includes maintenance, health and safety services, engineering, and operations. The section supervisors are responsible for performing quality-related activities in accordance with established quality assurance policies and requirements. 8

17.0.2.3.2 Modification Manager

The Modification Manager is responsible for implementing major plant modifications. He is responsible for providing onsite personnel and other resources necessary to support the modification workload through utilization of his own resources, other TVA organizations, or outside contractors.

17.0.2.3.3 Site Services Manager

The Site Services Manager is responsible for providing direct onsite support to the plants in the areas of regulatory engineering, codes and standards, automated data processing, project engineering, drawings and vendor manuals, procurement, administrative services, and material storage and issuance.

17.0.2.3.4 Design Services Manager

The Design Services Manager is responsible for providing design engineering services needed for plant modifications and changes in accordance with applicable criteria, standards, and quality assurance requirements. He also provides design control, verification, and safety analysis of plant changes.

17.0.3 Project Management Organization

The Project Manager is responsible and accountable for overall project performance of unlicensed nuclear units on the assigned project. The Project Manager establishes project objectives and develops and implements a program for controlling the acquisition of engineering, design, construction, and operational support (preoperational testing, instrument calibration, maintenance, etc.) services. He plans and ensures accomplishment of the project objectives through general oversight and participation in project-related activities of service organizations. The Project Manager is assisted by Project Engineers for specific areas of responsibility.

NUC PR and the PMO are responsible for the interface documentation to clearly define the responsibilities and authority dealing with the transition from construction to operational phase for each nuclear unit. The Project Management Organization is shown on Figure 17A-5, Appendix A. 8

17.0.3.1 Project Engineers (Engineering, Design, and Compliance) are responsible for assisting the Project Manager in establishing the project objectives for engineering and design. They evaluate and report on the performance of the supplier of engineering and design services. Through oversight and active participation in project-related activities, they ensure that engineering and design meet the established objectives including compliance with regulatory commitments. These Project Engineers are the Project Manager's representatives for all NRC licensing and compliance matters.

17.0.3.2 Project Engineers (Construction and Operational Support) are responsible for assisting the Project Manager in establishing the project objectives for construction and operational support. They evaluate and report on the performance of the supplier of construction and operational support services. Through oversight and active participation in project-related activities, they ensure construction and operational support meet the established objectives.

17.0.3.3 Project Engineers (Quality Achievement and Assurance) are responsible for assisting the Project Manager in establishing the project objectives for quality and developing and implementing a quality assurance program for controlling the acquisition of engineering, design, construction, and operational support services. They evaluate and report on the adequacy and effectiveness of the service organizations' program for achieving and assuring quality. Through oversight and active participation, they ensure that the service organizations meet the project objectives for quality.

17.0.4 Office of Power Operations 8

The Office of Power Operations organization is shown on Figure 17A-6, Appendix A.

17.0.4.1 Division of Operations Support

The Director, Operations Support, reports to the Manager, Power Operations and directs the activities of the Maintenance Coordination Staff (MCS).

The Maintenance Coordination Staff supervises the activities of the Power Service Shops (PSS) and the Central Laboratories Services (CLS). The Chief, MCS, is responsible for developing an operational quality assurance program for PSS and CLS, and ensures that responsibilities within the respective organizations are clearly defined.

17.0.4.1.1 Power Service Shops

The PSS provide support services (e.g., fabrication, repair, assembly, rework) to the nuclear plants in accordance with applicable quality assurance requirements. 7

17.0.4.1.2 Central Laboratories Services

The CLS organization is responsible for maintaining laboratory standards and calibrating portable measuring and test equipment in accordance with applicable quality assurance requirements. They also provide metallurgical and chemical analysis of various types for the Offices of Construction and Nuclear Power.

17.0.4.2 Division of Power System Operations

The Division of Power System Operations reports to the Manager, Power Operations and is responsible for the calibration, functional checking and other tests required to ensure satisfactory performance of electrical controls, instrumentation and relaying of TVA's transmission systems and switchyards, power transformers, and main generators, including the auxiliary power system within the nuclear plant, as assigned by the plant manager. 8

17.0.5 Office of Corporate Services

The Office of Corporate Services is shown on Figure 17A-1, Appendix A.

17.0.5.1 Division of Purchasing

The Division of Purchasing (PURCH) administers all procurements but is not responsible for determining the technical and quality assurance requirements of any procurement. These requirements are obtained from or established by and are administered by the organization initiating the procurement. The Division of Purchasing is responsible for ensuring the procurement requirements are placed on the requests for quotes or invitations to bid and for asesembling and issuing these invitations or requests; opening and reading bids in public; evaluating responsiveness to the terms and conditions; submitting the bids to the requisitioner for technical and quality assurance evaluation and recommendations; obtaining the necessary administrative approvals; awarding and issuing contracts; and negotiating and making changes of contract. A contracting officer is named for each contract by the Division of Purchasing. The contracting officer is responsible for ensuring that provisions of the contract are met. Changes affecting technical or quality assurance requirements are approved by the requisitioning organization and the contracting officer. 7 8

17.0.6 Office of Engineering

The Office of Engineering provides engineering, design, and procurement services to the Watts Bar and Bellefonte Project Management Offices and the Office of Nuclear Power and is responsible for establishing and implementing a quality assurance program which satisfies the TVA nuclear quality assurance program and Section 17.1. The Office of Engineering maintains responsibility for the integrity of engineering and design of TVA facilities throughout their operating lifetime. The Office of Engineering organizations involved in the nuclear quality assurance program are shown on Figure 17A-7, Appendix A. 8

Engineering, design, and procurement services provided for TVA nuclear facilities by the Office of Engineering are organized and managed through engineering projects within the Division of Engineering Projects Nuclear. Within each nuclear project, engineering and technical staffing and direction are provided for each technical discipline by the branch chiefs from the Division of Engineering and Technical Services. Thus, work by the Office of Engineering on a given TVA nuclear project is organized, managed, and administered on a project basis, with the discipline branches from the Division of Engineering and Technical Services providing technical resources and direction through discipline project engineers for performance of work on the project. The Division of Engineering and Technical Services is responsible for the quality and technical adequacy of engineering, design, and procurement services provided by the Office of Engineering and for the engineering methods and procedures used by the office to control performance of those services.

Manager of Engineering

The Manager of Engineering reports directly to the Manager of Power and Engineering and is responsible for providing or obtaining quality engineering, design, and procurement services, and for assuring that quality is achieved in services provided or obtained by the office. The Manager of Engineering is responsibile for ensuring the integrity of engineering and design of TVA facilities throughout their operating lifetime. He assures that responsibilities for achieving and assuring quality are clearly defined and understood by the respective organizations within the office and that each organization is adequate to accomplish its task. 8

Quality Management Staff

The Quality Management Staff is responsible for assuring the Manager of Engineering and the Directors of the Division of Engineering and Technical Services and the Division of Engineering Projects Nuclear that an effective quality program is established and implemented and for verifying by audit, review, and surveillance that quality program activities are being and have been effectively performed in accordance with the quality program.

The Programs Group of the Quality Management Staff is responsible for reviewing, advising, and providing input on engineering, design, administrative, and other procedures and instructions that control quality-related activities; for providing interpretation and clarification on quality requirements and commitments; drafting quality policy statements,

directives, and orders; interfacing with other quality organizations; and ensuring the established quality program is effective and adequate.

The Audit Group of the Quality Management Staff is responsible for planning, scheduling, and conducting audits and participating in joint audits; conducting and participating in reviews and surveillance of quality-related engineering, design, and procurement activities; developing audit, review, and surveillance files and records; reporting on audits, reviews, and surveillances; and reviewing and following up on implementation of corrective action to deficiencies identified during the conduct of audits, reviews, and surveillances.

17.0.6.1 Division of Engineering Projects Nuclear

The Division of Engineering Projects Nuclear is responsible for managing and administering the overall requirements and resources of the nuclear projects for the Office of Engineering. Included are defining project scope and cost, establishing and meeting schedule and budget, maintaining production control, and maintaining effective interfaces with the PMO, NUC PR, and the constructing organization or contractor on matters relating to the project. The Division of Engineering Projects Nuclear organization is shown on Figure 17A-8, Appendix A. 8

17.0.6.1.1 Bellefonte, Browns Ferry, Sequoyah, and Watts Bar Engineering Projects

The engineering projects are responsible for managing and administering the overall requirements and resources of the project for the Division of Engineering Projects Nuclear. This responsibility includes establishing and maintaining the project scope, costs, schedules, budgets, quality, and interfaces with the PMO, NUC PR, and the constructing organization or contractors. The engineering project for each TVA nuclear facility is typically organized as shown on Figure 17A-9, Appendix A.

Engineering Project Manager

The project manager is responsible for establishing, monitoring, and maintaining project scope, schedule, budget, and interfaces with the PMO, NUC PR, and the constructing organization, and for assuring the project work is completed on schedule and according to plan.

Discipline Project Engineers (Civil, Electrical, Mechanical, Nuclear)

Discipline project engineers are assigned by each discipline branch chief to the project and are responsible for the control and coordination of the discipline's work on the project. They are responsible to the project manager for the quality and technical adequacy of the discipline's work and associated interdisciplinary design interfaces on the project. The discipline project engineers are administratively and technically under the discipline branch chief, while serving under the production control of the Project Manager.

17.0.6.2 Division of Engineering and Technical Services

The Division of Engineering and Technical Services provides engineering resources, consultant services, technical direction, technical services, and expertise to the Division of Engineering Projects Nuclear and to other organizations outside of the Office of Engineering, as requested, by maintaining a central body of expertise and experience in all necessary engineering disciplines and technical specialties to assure consistency, quality, and technical adequacy of all programs of the Office of Engineering. The Division of Engineering and Technical Services organization is shown on Figure 17A-10, Appendix A. 8

The discipline branches (Civil, Electrical, Mechanical, and Nuclear) assign project engineers and technical personnel to the engineering projects to coordinate and control the discipline work on the project. The discipline branch chiefs are responsible for the quality and technical adequacy of engineering, design, and procurement activities by the Office of Engineering on each nuclear project.

17.0.6.2.1 Civil Engineering Branch

The Civil Engineering Branch provides resources, consultant services, technical direction, technical services, and expertise in the areas of structural and civil engineering, engineering mechanics, geology and geotechnical engineering, site development and project layout, highway, railroad and bridge engineering, and piping analysis and pipe support design. The branch assures consistency, quality, and technical adequacy of the civil engineering aspects for the office.

17.0.6.2.2 Electrical Engineering Branch

The Electrical Engineering Branch provides resources, consultant services, technical direction, technical services, and expertise in the areas of electrical systems engineering, electrical equipment contract engineering, instrumentation and controls engineering, communications systems engineering, and operator interface computer applications engineering. The branch ensures consistency, quality, and technical adequacy of electrical engineering aspects for the Office of Engineering.

17.0.6.2.3 Mechanical Engineering Branch

The Mechanical Engineering Branch provides resources, consultant services, technical direction, technical services, and expertise in the areas of basic plant arrangements and mechanical systems/ equipment, and mechanical, environmental, chemical, fire protection, and health and safety engineering. The branch assures consistency, quality, and technical adequacy of the mechanical engineering aspects for the Office of Engineering. The branch provides physical modeling capability in the operation of the engineering model shop.

17.0.6.2.4 Nuclear Engineering Branch

The Nuclear Engineering Branch provides resources, consultant services, technical direction, technical services, and expertise in the areas of nuclear engineering and nuclear safety. This includes the areas of nuclear features and systems; overall plant safety; radiation control and protection; radwaste and environmental control; nuclear licensing and regulatory compliance; preoperational and startup testing; codes, standards, metallurgy, and welding engineering; and quantitative analysis, reliability, availability, and risk analysis. The branch assures consistency, quality, and technical adequacy of nuclear engineering and nuclear safety aspects for the Office of Engineering. The branch is responsible for managing the overall operation of a central materials engineering laboratory for testing and evaluation of concrete, soils, metals, and other engineering material.

17.0.6.2.5 Engineering and Computer Methods Branch

The Engineering and Computer Methods Branch provides the resources, consultant services, technical direction, technical services, and expertise in the areas of assessment, application, development, maintenance, and planning of quality, efficient, economical, consolidated and integrated scientific and business computer application systems; advises on and recommends engineering methods and procedures and associated computer

applications for improving efficiency in engineering operations and the quality and technical adequacy of engineering results; and manages the office level engineering procedures, instructions, identification systems, standards, and guides. The branch ensures consistency, quality, and technical adequacy of its products and services.

17.0.6.2.6 Quality Engineering Branch

The Quality Engineering Branch (QEB) provides resources, consulting services, technical direction, technical services, and expertise in the areas of supplier surveillance, procurement document quality requirement review, plant surveys to determine bidder's manufacturing capabilities, and it creates and maintains the primary supplier record source.

The branch is responsible for reviewing Office of Engineering purchase requisitions for nuclear projects to assure that quality assurance requirements are adequately specified. It obtains decisions from the technical engineer on matters requiring engineering resolutions as related to test results and fabrication problems. It visits supplier locations where specified to review activities, processes, hardware, and records documents to assure that suppliers meet the requirements of procurement documents; reviews selected inspections reports and surveillance activities of NSSS inspectors; and reports results of surveillance activities. QEB personnel may initiate stop work through the branch chief's office, the responsible technical engineer, and the TVA contracting officer. 8

17.0.7 Office of Construction

The Office of Construction (CONST), as shown on Figure 17A-11, Appendix A, provides construction service to NUC PR and the PMO and is responsible for establishing and implementing a quality assurance program which satisfies the requirements of Section 17.1 and the nuclear quality assurance program. CONST performs the following which relate directly to quality assurance.

(1) Plan, organize, coordinate, and control the construction sequence and procedures.

(2) Develop and issue construction procedures and maintain construction site quality assurance records.

(3) Site investigations, exploratory drilling, and soil and rock core analysis testing.

(4) Site preparation, including, excavation, backfilling, and compaction.

(5) Receive, inspect, and store materials and equipment at the construction site (except nuclear fuel, and in-core equipment for which the Office of Nuclear Power is responsible).

(6) Construction of foundations and structures.

(7) Fabricate and install parts, components, and appurtenances.

(8) Construct and erect all parts of the plant including the NSSS except portions which are contracted.

(9) Verify all fabrication, installation, construction, and erection activities at the site, including work by field contractors.

(10) Conduct construction tests in accordance with approved procedures.

Manager of the Office of Construction

The Manager of the Office of Construction is responsible for activities implemented during construction. He determines the area of responsibility assigned to each branch or project of the Office. He assures that responsibility for quality assurance is clearly defined and understood by the respective branches/projects and that each organization is adequate to accomplish its task.

Assistant Manager of the Office of Construction (Nuclear)

The Assistant Manager of the Office of Construction (Nuclear) is responsible for planning, coordinating, and directing construction support for major nuclear projects, nuclear services, and the management of deferred and cancelled nuclear construction projects. He coordinates quality assurance matters with the Construction Quality Assurance Branch Chief.

17.0.7.1 Construction Quality Assurance Branch

Construction Quality Assurance Branch reports to the Manager of the Office of Construction, and the branch responsibilities include:

1. Developing, maintaining and providing an independent review of procedures contained in office-level quality assurance manuals.

2. Maintaining surveillance over TVA construction activities to determine and verify that quality objectives are being attained.

3. Planning and performing audits of quality assurance activities during construction to determine and verify their adequacy and effectiveness.

4. Following up to assure resolution of quality problems identified either internally or by NRC or others.

5. Performing selected reviews, inspections, examination, or tests if deemed necessary to assure that quality objectives are achieved.

6. Performing management reviews of selected program activities.

7. Administering trend analysis reporting. 8

8. Training and certifying welding inspectors and NDE examiners.

17.0.7.2 Nuclear Services Branch

The Nuclear Services Branch (NSB) is responsible for construction work on licensed units after licensing of the last plant unit and for providing modification or addition services when requested by NUC PR. Organization of the NSB is similar to the CONST Project Management Organization on larger jobs and is appropriately reduced for smaller projects.

17.0.7.3 CONST Project Manager

The Project Manager for each plant is responsible for constructing the plant and assigned modifications in accordance with design and quality assurance requirements. The Project Manager is responsible for ensuring the adequacy of the organization to accomplish its quality responsibilities and ensuring the importance of quality requirements are understood by the project personnel. The Project Manager periodically reviews the status and adequacy of the project quality assurance program and keeps the Manager of the Office of Construction informed of all matters relating to quality.

17.0.7.3.1 Construction Engineer Organization

The Construction Engineer Organization (CEO) is responsible for implementing design requirements and construction site quality assurance procedures. The CEO directs the activities of onsite engineering personnel in their respective areas of responsibility and ensures that they receive necessary controlled documents and information from other TVA organizations, manufacturers, fabricators, site erectors and contractors, and from the NSSS supplier. The CEO coordinates and resolves major problems which have not been resolved through normal channels, or refers such matters to the attention of the Project Manager for resolution. The CEO may stop any site operation if necessary to meet quality assurance requirements. 7

CEO staff of engineers make judgments of acceptance of inspection requirements where the requirements are set by the CEO staff in the instruction of craftsmen in the proper method and sequence of fabrication, erection and installation. The CEO staff of CONST engineers may make interim judgment of acceptance of inspection findings which are not within the literal limits of specifications and their tolerances as defined by the design engineering organization. Limits are established so that these judgments are of a minor nature. In the cases where the requirements are set by the responsible design organization, judgments are reviewed, approved, and documented by the responsible design organization. Required field changes which deviate from design requirements are subject to approval by the design engineering organization. 7

In addition to the above responsibilities, the Construction Engineer Organization is responsible for: directing construction testing programs; maintaining 'as-built' condition of the facility; recording, coordinating, and channeling design deviations through the Office of Engineering; providing technical guidance to craft and service management; requisitioning permanent material in accordance with design specifications approved by the Office of Engineering; and maintaining a very close and unrestricted line of communication with the Office of Engineering, Office of Nuclear Power, and the CONST Quality Assurance Branch. 8

In addition to the duties listed above, the Construction Engineer Organization at Hartsville and Yellow Creek also perform the applicable duties of the Quality Manager as defined in the following section entitled Quality Manager Organization. 7

Duties of the units in the CEO at Watts Bar and Bellefonte include:

(1) Advise craftsmen on proper methods and sequences for fabrication, installation, and erection.

(2) Serve as liaison between the construction forces and design forces.

(3) Determine the need for field purchases and coordinate the specifications for field-purchased materials.

(4) As-construct drawings and mark prints with alterations which have been approved by the Design Project Organization.

(5) Direct and coordinate engineering work to support production schedule.

(6) Identify the required inspections for each feature in the accountability program and check to verify that permanent quality assurance records have been statused.

(7) Initiate and prepare Field Change Requests (FCR). 7

(8) Coordinate the preparation of field fabrication orders for permanent and nonpermanent features.

(9) Provide drafting service for the project which includes drawings for temporary construction features, weld maps, and drafting of concrete progress charts.

(10) Generate and control the requirements for documentation necessary to fabricate and install seismic pipe supports for which the project has been assigned design responsibility.

(11) Administer welder and welding operator qualification tests and maintain appropriate records.

(12) Prepare initial operation releases and tentative and final transfers of features.

(13) Coordinate and conduct preoperational chemical cleaning of piping systems.

(14) Schedule and coordinate system construction testing and initial operation and energization of plant systems.

(15) Initiate and disposition nonconforming condition reports.

17.0.7.3.2 Quality Manager Organization

The Quality Manager Organization (QMO) is responsible for implementing CONST site quality assurance and quality control procedures. The QMO is responsible for assuring activities affecting quality are accomplished in accordance with the CONST Quality Assurance Program requirements and design requirements. The QMO performs a continuing review and approval of the site quality assurance program to assure that construction activities meet all applicable codes, standards, regulations, and licensing commitments. The QMO is responsible for reviewing and approving project-originated quality assurance and quality control procedures and instructions, project-originated purchase requisitions, project-selected suppliers, the construction test manual, test packages, test results, project standard operating procedures, and for preparation of the project trend analysis program. The QMO is responsible for ensuring that project selected suppliers are acceptable sources of the items to be purchased, and for providing recommended dispositions, interpretations, and guidance for compliance with site procedures and resolution of audit deficiencies. Except for welding inspectors and NDE personnel, and certain soils, concrete, and protective coating personnel, the QMO is responsible for implementation of the CONST quality assurance indoctrination, training, and qualification program at the site in order to assure that appropriate proficiency is achieved and maintained. The QMO is responsible for maintaining the site records accountability program to ensure that all quality assurance records are controlled, maintained, stored, and indexed for ready retrieval. The QMO applies to Watts Bar, Bellefonte, and will apply to Hartsville and Yellow Creek when construction resumes. The QMO may stop any site operation if necessary to meet quality assurance requirements. 7

Duties of the units in the QMO at Watts Bar and Bellefonte include:

(1) Coordinate distribution and control of site construction procedures and instructions.

(2) Receive and distribute drawings and specifications.

(3) Prepare, review, and revise site quality assurance and quality control procedures.

(4) Administer certification tests to quality control inspectors and document certification on appropriate records.

(5) Coordinate site quality assurance training.

(6) Maintain current listing of all open NRC inspector items and audit items.

(7) Interface with NRC site resident inspector and visiting NRC inspectors.

(8) Perform and document quality control inspections on items as required by procedures.

(9) Review and check inspection and test data.

(10) Perform and document receiving inspections on all safety-related items shipped to the site.

(11) Perform housekeeping inspection of all plant and storage areas. 7

(12) Administer qualification tests for certification of cadwelders and protective coating applicators and document results.

(13) Initiate and disposition nonconforming condition reports.

(14) Evaluation of work records required in the preparation of the ASME N-5 Data Report for code systems.

17.0.7.3.3 Project Management Services

The Project Management Services Supervisor is responsible for ensuring the adequacy of warehouse receiving, storage, and shipping of both equipment and material.

17.0.7.3.4 Construction Superintendent Organization

The Construction Superintendent Organization schedules and performs construction operations consistent with design requirements and CEO guidance and with proper regard for quality assurance requirements.

17.0.7.4 Hartsville and Yellow Creek Nuclear Plant Construction Organization

Hartsville and Yellow Creek Nuclear Plants are presently in a deferred status. When construction is resumed, the organizational structure for these plants will be similar to the organization of Watts Bar and Bellefonte. The present organizational structure for Hartsville and Yellow Creek is shown in Figure 17A-12, Appendix A, and described below.

17.0.7.4.1 Construction Site Manager

The Site Manager is responsible for preservation of the deferred plant in accordance with design and quality requirements. The Site Manager is responsible for ensuring the adequacy of the organization to accomplish its quality responsibilities and ensuring the importance of quality requirements is understood by project personnel. The Site Manager periodically reviews the status and adequacy of the site quality assurance program and keeps the Manager of the Office of Construction informed of all matters relating to quality.

17.0.7.4.2 Construction Engineer Organization (CEO) duties include:

1. Implementing all engineering design and quality assurance requirements necessary for the preservation of the deferred plant.

2. Assuring appropriate control and maintenance of quality assurance records.

3. Keeping the Site Manager informed of all matters related to quality.

17.0.7.4.3 Management Services Organization

The Management Services Section Supervisor is responsible for ensuring the adequacy of warehouse receiving, storage, and shipping of both equipment and material.

17.0.7.4.4 Construction Superintendent Organization

The Construction Superintendent Organization schedules and performs construction operations consistent with design requirements and with proper regard for quality assurance requirements.