17.0

TVA ORGANIZATIONS

PARTICIPATING IN THE

QUALITY ASSURANCE PROGRAM

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" (CSSC) 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 also applies to the development of safety-related computer software. This program description will be referenced in whole or in part in the SAR's of plants to which it is applicable. 9 9

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, sructure, 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.

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 plants to assure that the health and safety of the public are not compromised.

The management policies and requirements for the TVA nuclear quality assurance program are established by the Manager of Nuclear Power. 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. 9

The performing organizations prepare and maintain implementing procedures and instructions to assure implementation of TVA management requirements and resultantly our commitments. These procedures and instructions define the plans and instructions necessary for performance by the organizations assigned quality-related activities. 9

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. 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.

17.0.1 General

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

The organization charts included in Appendix A and referenced in this section show the structure of principal Office of Nuclear Power (ONP) organizations. However, only those positions within ONP that have QA responsibilities are described in this section. 9

Policy

TVA is committed to the achievement of quality in the design, construction, and operation of its nuclear facilities. This commitment is necessary to provide an adequate supply of electricity at the lowest possible cost consistent with TVA's responsibilities to protect the health and safety of its employees and general public and to protect the environment.

Quality performance in TVA's nuclear power activities is the responsibility of each and every person involved. The achievement of quality results must receive major emphasis in the planning, implementation, verification, and documentation of our work.

Quality is accorded top priority in situations where choices between quality and cost or quality and schedule are necessary. Activities and actions which promote the highest standards of quality accomplishment, such as comprehensive training, recognition of excellent performance, detection and reporting of problems, and vigorous corrective action, must be enthusiastically supported at all levels.

The Manager of Nuclear Power is vested with the overall authority and responsibility for TVA's nuclear activities. TVA's nuclear headquarters is divided into divisions which have responsibility for discrete types of functions. Each division is responsible for developing programs and standards, providing technical direction, and providing technical support for all activities within its function. Division management is accountable for the technical adequacy of all TVA activities within its functional area, both in nuclear headquarters and at the nuclear plants. Responsibility and authority for interpreting the requirements of TVA's QA program applicable to nuclear plant design, construction, and operational phase activities has been delegated to the Director, Division of Nuclear Quality Assurance (DNQA). DNQA is assisted by the Engineering Assurance organization in the Division of Nuclear Engineering (DNE) for design activities, and by the Nuclear Fuel QA organization in the Division of Nuclear Services (DNS) for activities related to nuclear fuel and fuel-related components and services. Activities at each of the nuclear sites will be headed by either a Nuclear Site Director (for operating plants) or a Nuclear Project Manager (for plants under construction). DNE is responsible for all design and engineering support activities. Within DNE, project teams have been established for each plant to provide support for all engineering activities associated with the plant. The Division of Nuclear Construction (DNC) is responsible for all construction and modification activities. DNS is responsible for core design and fuel and core engineering support activities. 9

Conflicts involving implementation of quality assurance requirements of TVA's QA program are resolved by the Director of Nuclear Quality Assurance or, if necessary, the Manager of Nuclear Power. 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

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elements for its nuclear facilities is shown in Figure 17A-1, Appendix A. Each of the key managers shown in Figure 17A-1 has a direct line of communication to the Manager of Nuclear Power for discussing matters relative to his area of responsibility.

17.0.2 Manager of Nuclear Power

The Manager of Nuclear Power 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. The Manager of Nuclear Power is accountable to the General Manager and Board of Directors for the adequacy and effectiveness of the nuclear program. He may further delegate responsibility and authority for execution of any part of the program but retains overall responsibility for its adequacy and effectiveness. He is assisted by a Deputy Manager who assists in carrying out the responsibilities of the Manager of Nuclear Power.

17.0.3 Assistant Manager ONP (Staffs)

The Assistant Manager ONP (Staffs) reports directly to the Manager of Nuclear Power and is responsible for providing technical direction and technical support to the Nuclear Procedures Staff, the Planning and Financial Staff, and Nuclear Personnel Staff.

17.0.3.1 Manager, Nuclear Procedures Staff

The Manager, Nuclear Procedures Staff has overall responsibility for the development and maintenance of the Nuclear Procedures System which consists of policies, directives, standards, procedures and instructions. The Manager, Nuclear Procedures Staff provides centralized coordination and assistance to ONP sites and divisions in the development and maintenance of Nuclear Procedures System documents pertinent to their respective areas of responsibility. This coordination and assistance is provided to division and site staffs responsible for Nuclear Procedures System document development and maintenance. This functional arrangement ensures an overall integrated system of procedures, uniform interpretation of requirements, and the utilization of standardized methodology for similar operations and activities performed by various sites and divisions.

To assure appropriate emphasis is placed on the establisment of the Nuclear Procedures System, the onsite staff responsible for procedure development and maintenance will report to the Nuclear Site Director. When the Nuclear Procedures System is fully established, this staff will report to the Manager of Site Services.

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17.0.4 Director of Nuclear Safety and Licensing

The Director of Nuclear Safety and Licensing is responsible for the central control (and consistency) of all TVA nuclear licensing processes, including programs, strategies, and documentation for licensing activities. The Director of Nuclear Safety and Licensing is assisted by the Assistant to Director - Licensing Support, the Manager of Nuclear Safety, the Manager of the Bethesda TVA Licensing Office, the Special Projects Manager, the Site Licensing Managers, and Manager of Generic Licensing. The Nuclear Safety and Licensing organization is shown in Figure 17A-2, Appendix A.

17.0.4.1 Assistant to Director - Licensing Support

The Assistant to Director - Licensing Support performs support services for the Director including directing activities to obtain permits and licenses for fuel and waste management; plans and organizes the TVA codes and standards program; and interprets regulatory requirements related to fuels.

17.0.4.2 Manager of Nuclear Safety

The Manager of Nuclear Safety develops and directs the Independent Nuclear Safety Engineering Group (ISEG) Program and coordinates the TVA Nuclear Operating Experience Review Program.

17.0.4.3 Manager, TVA Licensing (Bethesda Office) 9

The Manager, TVA Licensing (Bethesda Office) maintains an indepth understanding of ONP functions to permit analysis and reporting to the appropriate ONP organization those external governmental influences that impact the various ONP organizations (NRC developments and trends). He also serves as the liaison between ONP and NRC on licensing matters.

17.0.4.4 Special Projects Manager

The Special Projects Manager develops and plans corporate objectives and programs to provide support and direction for Nuclear Safety and Licensing. He performs assessments of the adequacy, effectiveness, implementation, and scheduling of those objectives and programs. He serves as liaison with other TVA offices to provide technical direction regarding licensing matters.

17.0.4.5 Site Licensing Managers

The Site Licensing Managers implement principles and programs needed to conduct all plant licensing activities and serve as official contacts with NRC for all activities involving their sites.

17.0.4.6 Manager of Generic Licensing

The Manager of Generic Licensing directs and maintains the tracking system for TVA commitments to NRC; directs the assessment of industry generic issues that could have programmatic impact; reviews and coordinates TVA responses for all NRC issuances of NRC IE bulletins and generic letters; and performs, reviews, and prepares comments regarding proposed regulatory documents.

17.0.5 Director of Nuclear Training

The Director of Nuclear Training is responsible for developing and implementing programs and standards from requirements established in the Nuclear Quality Assurance Manual to provide training to support the safe start-up and continual safe operation of all TVA nuclear plants. The Director of Nuclear Training establishes a structured systematic approach to training for the qualification of personnel who could affect the performance of safety related items and activities. This includes, but is not limited to, personnel involved in plant operations, engineering, technical, and maintenance personnel. The Director of Nuclear Training is assisted by the Chief of Maintenance and Services, the Chief of Quality and Management Systems, the Chief of Engineering and Technical Training, and the Chief of Operator Training. The Director of Nuclear Training is responsible for the operation and maintenance of all training facilities and features, including the control room simulators. The Nuclear Training organization is shown in Figure 17A-3, Appendix A. 9

17.0.5.1 Chief of Maintenance and Services

The Chief of Maintenance and Services is responsible for developing and implementing programs and standards for activities related to maintenance, modification, and engineering of control room simulators for plant sites. He is responsible for the management services (budget, administrative, ADP, etc.) for Nuclear Training. He is also responsible for the training and certification of instructors, for the establishment of the "Training System Development" process in Nuclear Training, and for the conduct of Job and Task analysis.

17.0.5.2 Chief of Quality and Management Systems

The Chief of Quality and Management Systems is responsible for developing and implementing programs and standards for training activities related to QA, QC, NDE, quality programs, quality surveillance, auditing, codes and standards, and project management.

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17.0.5.3 Chief of Engineering and Technical Training

The Chief of Engineering and Technical Training is responsible for developing and implementing programs and standards for training activities related to health physics, engineering, maintenance, craft work, chemistry, safety, and fire protection.

17.0.5.4 Chief of Operator Training

The Chief of Operator Training is responsible for developing and implementing programs and standards for training activities related to plant operators, nonlicensed operators, student operators, and operator requalification.

17.0.6 Director of Nuclear Quality Assurance

The Director of Nuclear Quality Assurance 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 requirements for nuclear activities including design, construction, and operation; implementation of quality engineering and quality control, QA surveillance, QC inspection, and verification activities in support of plant construction and operation; certification (as required) of DNQA personnel; and definition and implementation of a comprehensive audit program in compliance with nuclear regulatory requirements covering construction, operation, modifications, support activities, and suppliers and an annual programmatic audit of the Engineering Assurance organization's verification of design activities. In carrying out the above responsibilities, personnel within the Division of Nuclear Quality Assurance have the authority and organizational freedom to identify quality problems, initiate, recommend or provide solutions; and verify implementation of solutions. They notify responsible management of unsatisfactory work or unapproved practices, and if necessary, may stop unsatisfactory work or control further processing, delivery, installation, or operation of nonconforming items or services. The size of the QA organization fluctuates to accomodate peak work loads and activities. 9

The Division of Nuclear Quality Assurance organization is shown in Figure 17A-4, Appendix A.

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The Director of Nuclear Quality Assurance has the following qualifications: (1) a broad technical knowledge of the quality assurance function and its associated codes, standards, and procedures; (2) an understanding of TVA's corporate objectives, programs, and policies; (3) a strong commitment to nuclear safety; (4) extensive knowledge of the quality assurance criteria and standards for nuclear power plant design, construction, and operation; (5) demonstrated ability to interpret broad programmatic matters and to provide program direction; (6) strong oral and written communication skills and supervisory abilities; and (7) B.S. or M.S. degree or equivalent in an engineering or scientific discipline plus ten years' experience in the field of nuclear plant design, construction, operation, or quality assurance.

The Director of Nuclear Quality Assurance is assisted by the Nuclear Quality Audit and Evaluation Branch Chief, the Technical Support Branch Chief, the Quality Systems Branch Chief, the Procurement Quality Assurance Branch Chief, and the Site Quality Managers at each plant.

17.0.6.1 Nuclear Quality Audit and Evaluation Branch Chief

The Nuclear Quality Audit and Evaluation Branch Chief is responsible for the planning, conducting, reporting, and followup to ensure corrective action of audits of quality program related activities, performs programmatic audits of Engineering Assurance verification of design activities, and performs audits of operations, and construction phase activities (including Nuclear Project Manager activities). He reviews and audits the quality assurance programs of TVA organizations which support nuclear plant activities. He also performs assessments of on-going activities and problem areas to analyze trends, input to audit planning and scheduling, conduct generic evaluations, and prepare corporate assessments. The audit and evaluation program is in compliance with requirements of the plant technical specifications and commitments of this Topical Report and includes audits of interfaces between TVA organizations and suppliers of onsite services. 9

17.0.6.2 Procurement Quality Assurance Branch Chief

The Procurement Quality Assurance Branch Chief is responsible for developing and maintaining the Acceptable Suppliers List for nuclear procurements for design, construction, and operation phase activities. He performs supplier evaluations and audits to verify the acceptability of suppliers' QA programs and ensure that contracts are placed only with qualified suppliers, develops effective systems for implementing procurement-related QA requirements, and provides assistance in resolving

procurement-related quality assurance problems ensuring that conditions adverse to quality are identified, documented, and reported. He also ensures that resultant corrective actions are evaluated for adequacy and that actions are verified as being completed. He performs source surveillance of manufacturing and quality control activities at supplier plants.

17.0.6.3 Site Quality Manager

The Site Quality Manager at each site establishes and maintains a quality assurance organization to perform the quality engineering, quality control, quality improvement, and QA surveillance functions. The Site Quality Manager receives direct supervision from the Director of Nuclear Quality Assurance. The Site Quality Manager is involved in day-to-day plant safety-related activities through participation in plant meetings, review of relevant documentation, and execution of duties and responsibilities which include: 9

1. Assisting site management in developing, planning, initiating, and directing detailed nuclear plant quality assurance and quality control programs which meet requirements.

2. Performing quality engineering functions relative to site activities and providing verification of those activities including quality control inspections. 8

3. Evaluating the effectiveness of the nuclear quality assurance program by QA surveillances and making recommendations to site management regarding its implementation.

4. Reviewing and verifying that site instructions contain applicable quality assurance requirements, recommending approval, ensuring that they are controlled and distributed, and that employees are following the approved instructions. 9

5. Developing and implementing a quality control inspection program in accordance with NQAM requirements and covering construction, receipt of purchased items, modifications, maintenance, and repairs of CSSC items, and for reviewing site activities and keeping plant management advised of deficiencies.

6. Designating a representative to participate as a member of the Plant Operations Review Committee (PORC).

7. Pursuing the necessary corrective actions when quality assurance problems occur, to control further processing, delivery, or installation of nonconforming items. This includes authority to terminate an activity through stop work orders when manufacturing, construction, maintenance, repair, refueling, operation, or modification work fails to comply with approved plans, instructions, and specifications.

8. Preparing, reviewing, and revising site quality assurance and quality control procedures.

9. Working with line management to support quality improvement by performing functions such as trend analysis, root cause analysis of quality problems, evaluation of dispositions of major quality issues, interface with line management on quality improvement initiatives, and development of QA operational/start-up readiness assessment plans.

10. Evaluating construction work records required in the preparation of the ASME N-5 Data Report for Code Systems. 9

11. Administering the construction phase M&TE program for DNC.

12. Administering the QA records program for the construction phase.

17.0.6.4 Quality Systems Branch Chief

The Quality Systems Branch Chief is responsible for developing and maintaining upper-tier nuclear quality assurance program documents and for providing quality engineering services for the Office of Nuclear Power. Specific duties include developing and maintaining the nuclear quality assurance program which establishes and defines interpretations and requirements; maintaining this quality assurance topical report; maintenance of the ASME Code Manual; providing the quality engineering support and QA surveillance functions for the Chattanooga-based ONP organizations; performing ongoing reviews of quality assurance program documentation of TVA organizations supporting the nuclear program; establishing upper-tier requirements for selection, training, and certification of personnel performing quality assurance activities; and managing a program for tracking and trending of conditions adverse to quality.

17.0.6.5 Technical Support Branch Chief

The Technical Support Branch Chief directs the design and development of guidelines, procedures, and/or instructions supporting the performance of quality engineering, quality control, and QA surveillance. He ensures the design, development, and/or implementation of a qualification, training, and/or certification program for DNQA quality engineering, quality control, and QA surveillance personnel. He directs the design, development, and implementation of a system which includes integration of plant priorities, plans, and schedules to determine quality engineering and quality control staffing needs.

17.0.7 Assistant Manager ONP (Operations)

The Assistant Manager ONP (Operations) reports directly to the Manager of Nuclear Power and is responsible for providing technical direction and technical support for the Nuclear Site Directors at Browns Ferry, Sequoyah, and Watts Bar and the Director of the Division of Nuclear Services.

17.0.7.1 Director of Nuclear Services

The Director of Nuclear Services reports to the Assistant Manager ONP (Operations) and provides general support to TVA's licensed nuclear units. He is assisted by the Managers of Radiological Control, Support Operations, Management Systems, and Nuclear Fuel and the Chiefs of Industrial Safety and Emergency Preparedness. The Division of Nuclear Services organization is shown in Figure 17A-5, Appendix A. 9

17.0.7.1.1 Manager of Radiological Control

The Manager of Radiological Control is responsible for directing the ONP radiological control program to ensure compliance with regulations, commitments, and industry standards. He is also responsible for development and maintenance of radiation protection requirements and management controls for ONP.

17.0.7.1.2 Manager of Support Operations

The Manager of Support Operations is responsible for directing the development and implementation of the Office of Nuclear Power Security, Fire Protection, Nonradiological Environmental, and Nuclear Insurance programs. He is also responsible for performing technical assessments of nuclear facilities and support organizations' activities in the areas of operations, maintenance, and plant chemistry.

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17.0.7.1.3 Chief of Emergency Preparedness

The Chief of Emergency Preparedness is responsible for development, testing, coordination, and implementation of the TVA Radiological Emergency Plan (REP).

17.0.7.1.4 Manager of Management Systems

The Manager of Management Systems develops programs and standards providing for information systems and ADP, document control and records management, configuration management, and office services. To the extent that these programs and standards impact safety-affecting activities, they will be consistent with the requirements of the NQAM. 9

17.0.7.1.5 Manager of Nuclear Fuel

The Manager of Nuclear Fuel develops programs and standards for nuclear fuel supply (objectives, contract management, fuel use plans, environmental compliance), nuclear fuel engineering (reload core design and analysis, fuel and fuel-related component QA, fuel and core operational support, and fuel assembly and fuel-related component design evaluation/approval), uranium operations (mineral rights project, contractor performance, and geological and resource evaluation), and special projects related to nuclear fuel (spent fuel management and nuclear waste activities).

17.0.7.2 Nuclear Site Director

The Nuclear Site Director reports to the Assistant Manager ONP (Operations) and is responsible for the planning, scheduling, coordination, project direction, and control of activities at the site, including operations, maintenance, modifications, support, and engineering services. The Nuclear Site Director manages activities associated with the nuclear units and has the responsibility for determining the nature and extent of offsite support services required. He is responsible for the quality of work activities on licensed units. He ensures that site personnel are properly qualified and receive the necessary training. He is assisted by the Plant Manager and the Manager of Site Services. The Nuclear Site Director is also supported by site departments which are branches of an ONP headquarters division. The site departments include activities such as QA, engineering, licensing, and modifications. The site departments receive technical direction from their respective headquarters divisions and are responsible for providing direction to the plant for the activities of the site department. The Nuclear Site Director organizations are shown in Figure 17.A-6 and Figure 17A-7, Appendix A. 8 9

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17.0.7.2.1 Plant Manager

The Plant Manager has primary responsibility and authority for operation and safety at each plant. He verifies that established acceptance criteria are satisfied before accepting plant systems and components for operation. He also verifies that plant activities between initial system transfer and final transfer are authorized, approved, and carried out in accordance with approved procedures and instructions. He ensures that information is provided to the project engineer to be included in the as-built (as-configured) drawings and specifications and that objectives and performance defined during the design and construction phase are not degraded during subsequent maintenance activities. Through assignments to his group managers, he ensures that plant instructions are prepared in accordance with technical requirements, the quality assurance program, that an independent review verifies inclusion of appropriate quality requirements prior to implementation, 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. 9 8 9 8

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.

Plant operations includes the plant groups that report to the Plant Manager. This includes maintenance, radiological control, and operations and technical support. The group managers are responsible for the overall quality performance of their organization and for performing quality-related activities in accordance with established quality assurance policies and requirements. 9 8

17.0.7.2.2 Manager of Site Services

The Manager of Site Services is responsible for providing direct onsite support in the areas of facility maintenance, support services, automated data processing, document control, administrative services, on-site procedure services, and material storage and issuance. 9

17.0.8 Assistant Manager ONP (Engineering and Construction)

The Assistant Manager ONP (Engineering and Construction) reports directly to the Manager of Nuclear Power and is responsible for providing technical direction and technical support to the Division of Nuclear Engineering (DNE), the Division of Nuclear Construction (DNC), and the Nuclear Project Managers for plants under construction.

17.0.8.1 Director of Nuclear Engineering

The Director of Nuclear Engineering reports to the Assistant Manager ONP (Engineering and Construction) and is responsible for providing or obtaining quality engineering, design, procurement, and operations engineering support services, and for assuring that quality is achieved in services provided or obtained by the division. He is responsible for establishing and implementing a quality assurance program which satisfies the TVA nuclear quality assurance program and Section 17.1. The Division of Nuclear Engineering (DNE) maintains responsibility for the integrity of engineering and design of TVA facilities throughout their operating lifetime. This includes responsibility for acquiring or creating, and maintaining the technical record of the as-built facility and maintaining the record current with changes in the plant; and preparing and approving modification packages that change the design and configuration of the plant. The DNE organizations involved in the nuclear quality assurance program are shown in Figure 17.A-9, Appendix A. 9

Engineering, design, operating support, and procurement services provided for TVA nuclear facilities by DNE are organized and managed through engineering projects within the Project Engineering organization. Within each nuclear project, engineering and technical staffing and direction are provided for each technical discipline by the branch chiefs from Engineering and Technical Services. Thus, work by DNE on a given TVA nuclear project is organized, managed, and administered on a project basis, with the discipline branches from Engineering and Technical Services and Operations Engineering Services providing technical resources and direction through lead discipline project engineers for performance of work on the project. Engineering and Technical Services is responsible for the quality and technical adequacy of engineering, design, and procurement services provided by the DNE and for the engineering methods and procedures used by the division for management of those services Operations Engineering Services is responsible for providing operations support and to assure the technical adequacy of such services. Engineering Assurance is responsible for development of, and evaluation of compliance to, the quality program as applied to engineering and design activities.

The Director of DNE assures that responsibilities for achieving and assuring quality are clearly defined and understood by the respective organizations within the division and that each organization is adequate to accomplish its task.

17.0.8.1.1 Manager of Management Systems Support

The Manager of Management Systems Support is responsible for systems planning, information management, budgeting, accounting, clerical support, and human resource services for DNE.

17.0.8.1.2 Manager of Engineering Assurance

The Manager of Engineering Assurance is responsible for developing and maintaining the engineering quality assurance programs and standards in conjunction with the Division of Nuclear Quality Assurance (DNQA) and for implementing engineering assurance activities. The Manager of Engineering Assurance has the authority to stop engineering work that does not conform to established requirements. The Manager of Engineering Assurance, reports to the Director of DNQA on quality assurance matters. Engineering Assurance functions includes the following in DNE:

(1) Developing, approving, maintaining and controlling division-level engineering quality program procedures, standards, and instructions.

(2) Ensuring that engineering procedures interface effectively with organizations outside of the Division of Nuclear Engineering.

(3) Training division personnel on applicable policies and procedures.

(4) Facilitating implementation of engineering procedures through project Engineering Assurance engineers.

(5) Auditing to evaluate compliance with quality assurance programmatic requirements.

(6) Auditing to assess the technical adequacy and effectiveness of engineering work.

(7) Overviewing procured engineering services, including review of procurement documents for quality assurance requirements, and auditing contractors who provide only engineering services. Assists the Procurement Quality Assurance Branch in auditing hardware suppliers that also provide engineering services.

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(8) Assessing trends in engineering quality problems, problem identification, and administering corrective and preventative action for internally and externally identified generic problems.

The Engineering Assurance organization is shown in Figure 17A-10, Appendix A. 9

17.0.8.1.3 Manager of Project Engineering

The Manager of Project Engineering is responsible for managing and administering the overall requirements and resources of the nuclear projects for DNE. Included are ensuring suitability of project engineering work products, defining project scope and cost, establishing and meeting schedule and budget, maintaining production control, and maintaining effective interfaces with the Nuclear Project Managers, Nuclear Site Directors, and the Division of Nuclear Construction (DNC) or contractor on matters relating to the project. The Project Engineering organization is shown in Figure 17.A-11, Appendix A. 9

The project engineers are responsible for managing and administering the overall requirements and resources of the project for Manager of Project Engineering. This responsibility includes establishing and maintaining the project scope, costs, schedules, budgets, quality, and interfaces with the Nuclear Project Manager, Nuclear Site Directors, and DNC or contractors. The engineering project for a TVA nuclear facility is typically organized as shown in Figure 17.A-11, Appendix A. 8 9

17.0.8.1.3.1 Project Engineer

The Project Engineer is responsible for establishing, monitoring, and maintaining project scope, schedule, budget, quality, and interfaces with the Nuclear Project Manager, Nuclear Site Director, and DNC, and for assuring the project work is completed on schedule and according to plan.

The Project Engineer is responsible for overall suitability of engineering work performed on the project and is supported by lead discipline engineers assigned by each discipline branch chief to the project. The lead discipline engineers are responsible for the control and coordination of the discipline's work and associated interdisciplinary design interfaces on the project. The lead discipline engineers are administratively and technically under the discipline branch chief, while serving under the production control of the Project Engineer.

17.0.8.1.4 Manager of Engineering and Technical Services

The Manager of Engineering and Technical Services provides engineering resources, consultant services, technical direction, technical services, and expertise to Project Engineering and to other organizations outside of DNE 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 engineering efforts executed within DNE. The Engineering and Technical Services organization is shown in Figure 17.A-12, Appendix A.

The discipline branches (Civil, Electrical, Mechanical, and Nuclear) assign lead discipline engineers and technical personnel to the project engineer 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 DNE on each nuclear project.

17.0.8.1.4.1 Civil Engineering Branch Chief

The Civil Engineering Branch Chief provides resources, consultant services, technical direction, technical services, and expertise in the areas of structural and civil engineering, geology and geotechnical engineering, engineering project site layout, architecture, security and safeguards, piping analysis and pipe support design, and seismic qualification of equipment and components. The branch ensures consistency, quality, and technical adequacy of the civil engineering aspects for DNE.

17.0.8.1.4.2 Electrical Engineering Branch Chief

The Electrical Engineering Branch Chief 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 DNE.

17.0.8.1.4.3 Mechanical Engineering Branch Chief

The Mechanical Engineering Branch Chief 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

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ensures consistency, quality, and technical adequacy of the mechanical engineering aspects for the DNE. The branch provides physical modeling capability in the operation of the engineering model shop. 8 9 8

17.0.8.1.4.4 Nuclear Engineering Branch Chief 9

The Nuclear Engineering Branch Chief 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; quantitative analysis, and probabilistic risk analysis. The branch ensures consistency, quality, and technical adequacy of nuclear engineering and nuclear safety aspects for DNE. The branch is responsible for managing the overall operation of the Singleton materials engineering laboratory for testing and evaluation of concrete, soils, metals, and other engineering material. 8 9 8

17.0.8.1.4.5 Engineering and Computer Methods Branch Chief 9

The Engineering and Computer Methods Branch Chief 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 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 development and maintenance of identification systems. The branch ensures consistency, quality, and technical adequacy of its products and services. 8 9 8

17.0.8.1.5 Manager of Operations Engineering Services 9

The Manager of Operations Engineering Services is responsible for developing and maintaining programs and standards and providing technical and staffing support to the Project Engineer at each operating nuclear plant in the following areas:

(1) Safety related mechanical systems and components and maintenance and engineering activities related to structures, systems, inservice inspection and analysis, chemical and chemical support, and containment testing.

(2) Safety related electrical and instrumentation and control (I&C) systems and components and the maintenance and engineering activities related to I&C equipment, communication, vibrations, and trouble shooting.

(3) Assessing equipment failures, reliability engineering, analysis, and design review.

The Operations Engineering Services organization is shown in Figure 17A-13, Appendix A.

17.0.8.2 Director of Nuclear Construction

The Director of Nuclear Construction (DNC) provides construction and modification services to the Nuclear Site Directors and the Nuclear Project Managers. He is responsible for establishing and implementing a quality assurance program which satisfies the requirements of this topical report and the nuclear quality assurance program. DNC performs the following which relate directly to quality assurance:

(1) Plans, organizes, coordinates, and controls the construction sequence and procedures.

(2) Develops and issues construction procedures.

(3) Performs site investigations and exploratory drilling. 9

(4) Performs site preparation including excavation, backfilling, and compaction.

(5) Receives, processes, and stores materials and equipment at the construction site (except nuclear fuel, and in-core equipment).

(6) Constructs foundations and structures.

(7) Fabricates and installs parts, components, and appurtenances.

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

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

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

(11) Provides construction services for modifications in operating plants.

The Division of Nuclear Construction organization is shown in Figure 17.A-14, Appendix A. 9

The Director of Nuclear Construction reports to the Assistant Manager ONP (Engineering and Construction) and is responsible for the planning, scheduling, coordination, providing direction and control of activities implemented during construction. He determines the area of responsibility assigned to each branch or project of the Division. 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. 8 9 8

The Manager of Projects assists the Director, DNC, and provides construction and modification management budget recommendations, detailed cost and schedules, determines qualification requirements of key personnel, and assigns appropriate staffing levels and mix of management, engineering, and craft personnel for projects and modifications organizations. The Manager of projects directs construction of major nuclear projects and modification branches. 9

17.0.8.2.1 Manager of Modifications

The Manager of Modifications at each site is responsible for construction work on licensed units and for providing modification or addition services. The arrangement of the Modifications organization is similar to the DNC Project Manager's organization on larger jobs and is appropriately reduced for smaller projects.

17.0.8.2.2 DNC Project Manager

The DNC Project Manager for each plant is responsible for constructing the plant in accordance with design and quality assurance requirements. The DNC 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 DNC Project Manager periodically reviews the status and adequacy of the project quality assurance program and keeps the Director of DNC informed of all matters relating to quality. The DNC Project Manager is assisted by the Construction Engineer, the General Construction Superintendent, and Project Management Services Supervisor. 9

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

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

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

(3) Determines the need for and coordinates the specifications for field-purchases of permanent plant materials.

(4) Marks prints with alterations which have been approved by the Project Engineering organization and provide feedback to the Project Engineer.

(5) Directs and coordinates engineering work to support production schedule.

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

(7) Initiates and prepares field change requests.

(8) Provides drafting service for the project which includes drawings for temporary construction features.

(9) Administers welder and welding operator qualification tests.

(10) Prepares initial operation releases and tentative and final transfers of completed structures, systems, and components.

(11) Coordinates and conducts preoperational chemical cleaning of piping systems.

(12) Receives and distributes drawings and specifications.

(13) Schedules and coordinates system construction testing and initial operation and energization of plant systems.

(14) Initiates and dispositions conditions adverse to quality (CAQs) including nonconforming condition reports in accordance with approved procedures and documents.

9

(15) Develops and controls site-level construction engineering procedures implementing requirements established in DNC procedures and in project specific and general construction specifications.

(16) Ensures that construction engineering and craftsmen are trained in applicable techniques and procedures.

(17) Coordinates construction actions to resolve regulatory and licensing items and to track commitments as assigned by the Nuclear Project Manager.

17.0.8.2.2.2 Project Management Services Supervisor

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

17.0.8.2.2.3 General Construction Superintendent

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

17.0.8.2.3 Chief of Management Services

The Chief of Management Services is responsible for providing services for project control, industrial engineers, management information staff, estimating, cost accounting, and payroll.

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17.0.8.2.4 Chief of Field Services

The Chief of Field Services is responsible for developing, implementing, managing, and maintaining procedures for a division standard construction and modifications program. He provides technical program direction to construction and modifications engineers and is also responsible for materials and contracts management.

17.0.8.3 Nuclear Project Manager

For nuclear units under construction, the Nuclear Project Manager (NPM) has the authority and responsibility for planning, scheduling, and coordinating the nuclear project through and for providing project direction and control to the Project Engineer, Construction Project Manager, Plant Manager, Site Quality Manager, and Site Licensing Manager within the policies established by the Manager of Nuclear Power and guidelines and technical direction established by the Assistant Manager ONP

(Engineering and Construction). The NPM has the authority to determine what site activities should be undertaken and when they should be accomplished by directing project planning and scheduling, resource allocation, and cost control. The NPM is assisted by a project staff assigned specific areas of responsibility.

The Nuclear Site Director and the NPM are responsible for interfacing to clearly define the responsibilities and authority dealing with the transition from construction to operational phase for each nuclear unit. The Project Manager's organization is shown on Figures 17A-7 and 17A-8, Appendix A.

The NPM staff responsible for engineering, design, licensing, and compliance assists the NPM in planning, scheduling, coordinating, and providing project direction and control to the Project Engineer and Site Licensing Manager with regard to engineering, design, licensing, and compliance within the policies established by the Manager of Nuclear Power and the guidelines and technical direction established by the Assistant Manager ONP (Engineering and Construction). This NPM staff interfaces with the Site Quality Manager, Construction Project Manager, and Plant Manager to monitor the quality and timeliness of design output and engineering support for project activities and of licensing and compliance activities. This NPM staff serves as the NPM's representative for NRC licensing and compliance matters. Through oversight and active participation in project-related activities, this NPM staff ensures that engineering, design, and licensing services are provided on schedule and in accordance with project objectives. This NPM staff identifies areas where increased efficiency may be attained or where project objectives are not being achieved. 9

The NPM staff responsible for Construction and Operations Support assists the NPM in planning, scheduling, coordinating, and providing project direction and control to the Construction Project Manager and Plant Manager with regard to construction and operations support within the policies established by the Manager of Nuclear Power and guidelines and technical direction established by the Assistant Manager ONP (Engineering and Construction). This NPM staff interfaces with the Site Quality Manager to monitor the quality of construction and operations support activities. Through oversight and active participation in project-related activities, this NPM staff ensures that construction and operations support services are provided on schedule and in accordance with project objectives. This NPM staff identifies areas where increased efficiency may be attained or where project objectives are not being achieved. This NPM staff provides day-to-day direction for major site facilities.

The NPM staff responsible for cost, schedule, and change control assists the NPM in planning, scheduling, coordinating, and providing project direction and control to the Project Engineer, Site Construction Manager, Site Quality Manager, and Site Licensing Manager with regard to cost, schedule, and changes within the policies established by the Manager of Nuclear Power and guidelines and technical direction established by the Assistant Manager ONP (Engineering and Construction). This NPM staff serves as the NPM's representative for cost, schedule, and performance matters. Through oversight and active participation in project-related activities, this NPM staff ensures that the project cost estimate, schedule, and performance goals and objectives are being adhered to and/or accomplished as planned. This NPM staff identifies areas where increased efficiency may be attained or where project objectives are not being achieved. This NPM staff is responsible for preparing an accurate total project cost estimate and annual operating plan.

17.0.9 Manager of Power

The office of Power is a segment of TVA which is primarily responsible for non-nuclear activities, but provides some safety related services to the Office of Nuclear Power. The Manager of Power supports the execution of the nuclear program by providing procurement, receiving, and storage services, but does not report to the Manager of Nuclear Power. The office of Power has representatives assigned to interface with the Office of Nuclear Power to ensure close coordination and cooperation between the organizations. The Manager of Power has an Assistant Manager who is responsible for the organizations supporting the nuclear program. The office of Power organization is shown in Figure 17.A-15, Appendix A. 9

17.0.9.1 Director of Operations Support

The Director of Operations Support reports to the Assistant Manager of Power and directs the activities of the Manager of Materials.

17.0.9.1.1 Manager of Materials

The Manager of Materials is responsible for activities related to the procurement of materials, parts and components provided as a service to the Office of Nuclear Power. These activities include the administration, security, implementation, and operation of the agency-wide materials management system; the offsite procurement, packaging, shipping, receiving, storage and handling of materials, parts and components to support the operational phase of TVA's nuclear power plants. In addition the Manager of Materials is responsible for the onsite administration

of activities pertaining to the procurement, receipt, storage, handling and issue of materials, parts, and components for TVA's nuclear plants provided as a service to the Nuclear Site Director. The Manager of Materials is assisted by the Materials Quality Assurance Supervisor, the Chief of Power Stores Branch (PSB) and the Chief of Materials Information Systems Branch (MISB).

17.0.9.1.1.1 Materials Quality Assurance Supervisor

The Materials Quality Assurance Supervisor is responsible for the development and maintenance of a Quality Assurance (QA) program which satisfies the requirements of the Topical Report and the Nuclear Quality Assurance Manual for both PSB and MISB. The PSB QA program provides QA and QC activities relative to material procurement, classification, receipt, storage and transfer. The MISB QA program provides QA activities relative to material procurement and information system security.

17.0.9.1.1.2 Chief of Power Stores

The Chief of Power Stores is responsible for assisting the Nuclear Site Directors in planning, procurement, classification, receipt, storage, issuance, and inventory of materials, parts, components and supplies for the maintenance and operation of the licensed nuclear units.

17.0.9.1.1.3 Chief of MISB

The Chief of MISB is responsible for the administration, security, implementation, and operation of the agency-wide materials management system. 9

17.0.9.2 Director of Power Systems Operations

The Director of Power Systems Operations (PSO) reports to the Assistant Manager of Power and is responsible for the development and issuance of relay settings and maintenance, calibration, functional checking, and testing of assigned equipment at TVA's nuclear plants provided as a service to the Nuclear Site Directors and Nuclear Project Managers.

17.0.10 Manager of Corporate Services

The Manager of Corporate Services supports the execution of the nuclear program but does not report directly to the Manager of Nuclear Power. The Manager of Corporate Services has representatives assigned to interface with the Office of Nuclear Power to ensure close coordination and cooperation between the organizations. The Corporate Services organization is shown in Figure 17A-1, Appendix A.

The Office of Corporate Services provides a range of management support to TVA organizations. The support activities covered by the nuclear QA program include developing and administering the system for procurement, disposal, and shipping of equipment, materials, supplies, fuels, and services needed by TVA's nuclear facilities. 9

17.0.10.1 Director of Purchasing

The Director of Purchasing reports to the Manager of Corporate Services and is responsible for 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 Director of Purchasing is responsible for ensuring the procurement requirements are placed on the requests for quotes or invitations to bid and for assembling 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 Director 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 and quality assurance organizations and the contracting officer. 9 9 8 9

11-3-86

17.1

TVA QUALITY ASSURANCE PROGRAM

PROGRAM APPLICABLE TO

DESIGN

and

CONSTRUCTION

17.1.1 Organization

The TVA organizations participating in the establishment and implementation of the TVA quality assurance program applicable to design and construction are described in Section 17.0 of this report.

17.1.2 Design and Construction Quality Assurance Program

The quality assurance program is defined by the requirements detailed in the Nuclear Quality Assurance Manual (NQAM) maintained and controlled by the Division of Nuclear Quality Assurance. 9

17.1.2.1 Scope

The quality manuals and procedures listed in Table 17E-1 comprise the documented quality assurance program of the Divisions of Nuclear Engineering and Nuclear Construction. These documents are implemented during design and construction to assure that the resulting TVA nuclear plant can be safely operated. These requirements are mandatory as established by the Division of Nuclear Quality Assurance. 9

General summaries of the assignment of design and procurement responsibilities between TVA and NSSS supplier and the responsibility for design review of these structures, systems, and components are given in the Appendix C tables listed below for the indicated plants:

Nuclear Plant	Table No.
Bellefonte (BLN)	17C-1
Watts Bar (WBN)	17C-2

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Chapter 3 of the SAR for each of the nuclear plants listed above identifies the structures, systems, and components to which this section applies.

The quality assurance program controls over quality related activities pertaining to design and procurement initiated before submitting the PSAR are described in this topical report.

Quality assurance program controls over safety related site preparation are provided by an interfacing quality assurance procedure contained in the NQAM which distributes responsibilities among the various TVA organizations involved. 9

Specific TVA responsibilities are defined in the appropriate parts of this report which was developed with due regard to interfaces between offices, divisions, and branches, within TVA and interfaces with the NSSS supplier. 9

17.1.2.2 Quality Assurance Program Documentation

The quality assurance program is documented by approved procedures. TVA will follow the guidance of NRC Regulatory Guides as described in the table 17D-1, Appendix D, for BLN and WBN. 9

Appendix B of this topical report contains a list of procedures and the criteria of Appendix B to 10 CFR 50 which they implement for DNE and DNC, respectively. These lists are of the present or planned procedures and will not be kept current. TVA may unilaterally delete, add, or renumber those procedures without revising this report, but will maintain the same overall program coverage. The list of procedures in these tables will be reviewed with each revision of this topical report and will be revised if required to reflect the current program. DNQA verifies that DNE and DNC procedures reflect the latest changes in this topical report. 9

17.1.2.3 Indoctrination and Training

An indoctrination and training program for personnel performing quality related activities, including DNQA personnel, provides for: 9

(1) Instruction of personnel performing quality activities as to the purpose, scope and implementation of manuals, instructions, and/or for procedures related to the activities they perform.

(2) Training and qualification in the principles and techniques of the activities performed. When formal certification training is required, proficiency tests are given and acceptance criteria are developed to determine if individuals are properly trained and qualifed. Certifications delineate the functions personnel are qualified to perform and the criteria used for certification. 9

(3) Documenting the scope, objective and the method of implementing the specific parts of the indoctrination and training program.

(4) Maintaining the proficiency of personnel performing quality related activities by retraining, reexamining, and/or recertifying.

(5) Documenting formal training sessions describing content, who attended and when attended.

Indoctrination and training practices of DNE and DNC are as follows:

a) DNE Indoctrination and Training

DNE personnel performing quality related activities are qualified through indoctrination and/or training. The responsibility for performing quality related activities is assigned only to qualified personnel.

The need for special indoctrination and/or cross training required to improve or maintain proficiency may be identified by any DNE branch, project, or staff organization.

DNE procedures include a training requirements matrix which relates individual quality assurance training requirements to specific job functions important to safety and requires each respective branch chief/project manager to ensure that his employees are trained in the TVA and DNE procedures which control their work.

b) DNC Indoctrination and Training

Indoctrination, instruction, training, and qualification of DNC personnel who perform quality-related activities is accomplished in accordance with the DNC quality assurance program.

The training program provides for the indoctrination of all new employees; formal training for selected personnel in specific topics and/or procedures, training, certification, and recertification for selected craftsmen. The Quality Training Program Manual defines responsibilities for implementation of the training program and the record requirements.

17.1.2.4 Quality Assurance Program Implementation

The quality assurance activities applicable to design and construction are implemented by written administrative and technical directives, standards, and procedures, as required to assure compliance with the overall objectives as defined herein. These include such documents as:

Statements of Policy
Administrative Instructions
Position Descriptions for Management, Professional, and Technical Personnel
Quality Assurance Procedures

Quality Control Procedures
Purchasing Procedures
Engineering Procedures
Testing Procedures
Construction Procedures

Although administrative instructions, responsibility descriptions, job descriptions, purchasing procedures and engineering procedures are relative to the quality assurance program, they are not all considered to be required for proper execution of quality related activities and will not be maintained as quality assurance records. They are, however, retained in accordance with TVA administrative requirements which require maintenance, preservation and protection of essential records. In each division, quality assurance or engineering assurance personnel have free access to them and can request to review and for possible inclusion of quality-related information. These documents are maintained in accordance with approved procedures.

DNE and the DNC prepare and maintain procedures covering those aspects of the quality assurance program which require written procedures and well-defined activities. These procedures are reviewed by engineers with assigned quality assurance responsibility and are approved by appropriate levels of management. Revisions are reviewed and approved in a like manner.

The programs include several separate manuals which contain procedures that prescribe the methods for controlling and the steps in achieving the many specific DNC and DNE quality related activities. Interface procedures in the NQAM define responsibility for and the steps taken in achieving the activities conducted jointly by interfacing between divisions and offices. Controlled copies of appropriate manuals are issued to the individuals in organizations performing activities affecting quality.

If disputes over quality assurance requirements are identified, they are normally resolved at the level of management directly involved in the activity in question. If required, the matter can be carried to higher levels of management. DNQA is responsible for resolution of quality assurance disputes over interpretations of QA requirements. If resolution is not achieved, the matter is brought to the attention of the Assistant Manager ONP (Engineering and Construction) and, if needed, the Manager of Nuclear Power.

a) DNE Procedures

DNE procedures provide instructions in the areas of preparation, review, and control of design documents, such as design criteria, specifications, drawings, and those documents which prescribe quality assurance activities; and evaluations, technical surveillance, and verification of activities for suppliers of engineering services

b) DNC Procedures

DNC procedures provide for control of documents, materials, tests, handling and storage, and corrective actions at the construction site. Control of construction processes such as welding, stress relieving, and nondestructive examination is provided by construction specifications developed by DNE.

Quality-related construction activities are scheduled to be performed as the plant progresses through its various stages of construction. The schedule for preparation of construction procedures is based on the detail plant schedule for performing related activities as established and approved for construction. The procedures which provide control measures for activities related to quality are prepared and available before the scheduled performance of the activities.

The requirements for personnel qualification and training are delineated in the DNC Quality Training Program Manual. This manual addresses the indoctrination, instruction, qualification, and training for personnel performing and/or assuring quality assurance activities.

17.1.2.5 Program Assessment

The scope, status, adequacy, compliance and effectiveness of the quality assurance program and its implementation will be assessed and reported to appropriate levels of management, the Assistant Manager ONP (Engineering and Construction), and the Manager of Nuclear Power. This assessment is performed by DNQA using the results of internal and external reviews, audits, and surveillances, as well as performance and trend reports. In addition, DNQA will arrange for an annual assessment of its performance to be performed by an organization other than the quality assurance organization. This independent organization will be chosen based on its ability and the qualifications of its personnel to perform such assessments. These assessments will evaluate execution based on 10 CFR 50, Appendix B, and other regulatory and licensing requirements.

17.1.3 Design Control

Design controls specified in the Division of Nuclear Engineering procedures and as specified in this section are applied to design functions. Examples of design functions under these procedures are analyses (stress, thermal, hydraulic, radiation, seismic, etc.), materials selection (specification, qualification, compatibility, etc.), establishment of operation requirements (access, inspection, maintenance, and repair, etc.) and development/maintenance of computer programs.

Design control measures for the selection of suitable materials, parts, equipment, and processes are provided through the use of TVA design guides, standards, and specifications, and industry standards and specifications. Requirements of these standards and specifications are assembled, interpreted and amplified in design criteria which are design input documents subsequently issued as early in the plant design as needed to provide a consistent basis for making design decisions, for establishing design verification measures, and for evaluating design changes. Changes from specified standards are identified, approved, and controlled in accordance with DNE procedures.

17.1.3.1 Design Documentation

17.1.3.1.1 Preliminary Design

Preliminary design responsibilities are assigned to a lead branch or project engineer designated by the Director of DNE.

This project responsibility is an integrated responsibility to assure effective and timely coordination, communication, and integration of activities between DNE, DNC, the Assistant Manager ONP (Engineering and Construction), and the NSSS supplier during the preliminary engineering and design phase of the project. Qualified engineers from various engineering disciplines and specialists in various areas are temporarily assigned by other organizations within the DNE.

The project engineer or lead branch obtains additional engineering and design assistance of other organizations within DNE as needed to fulfill its responsibility. Assigned engineering specialists are required to obtain assistance from their parent branch or group as needed and are required to obtain such coordination and review as necessary for the parent organization to fulfill its responsibilities. Where this responsibility has been assigned to a lead branch, a project engineer is identified to assume this responsibility at an appropriate time in the preliminary design process.

During the preliminary design phase, the project engineer or lead branch is responsible for the following associated tasks as assigned through the lead discipline engineers: 9

(1) Develops selected general criteria, basic design parameters, preliminary engineering, preliminary design information for the project, and identifies safety related functions and systems.

(2) Assures that all general criteria, basic design parameters, preliminary engineering and preliminary design information for the project (including that to be furnished by other DNE organizations and the NSSS supplier) is developed in a timely manner. 9

(3) Assures that design information is reviewed by the responsible engineering branches.

(4) Assures proper control and review of design interfaces between TVA organizations and between TVA and the NSSS supplier. 3

(5) Prepares procurement specifications required during the preliminary design phase for long lead procurements.

(6) Coordinates the preparation of parts of the PSAR. 9

These assigned responsibilities assure that the Project Engineering Organization, which is responsible for development of the detailed design of the plant, has available the necessary design input.

17.1.3.1.2 Design Criteria 8

Basic design criteria are developed by responsible discipline branches in Engineering and Technical Services for each applicable feature system or major component which is designed by TVA. Criteria are reviewed by the engineers specifically assigned the responsibility and are approved by management. These criteria serve to assemble, interpret, and to amplify the applicable functional requirements, environmental constraints, regulatory requirements, and requirements in the PSAR and other licensing documents. The criteria identify safety related systems, equipment and components. They form the basis for translating requirements into detailed designs. These design criteria may include general design specifications which apply to class of equipment such as piping and equipment pressure parts, electrical equipment, or to environmental requirements such as seismic requirements for piping and for structures. 9

These design criteria take into account the varying degrees of importance of components and systems as evidenced by possible safety consequences of malfunctions or failure.

The NSSS supplier furnishes criteria in the form of system descriptions and/or specifications which are of sufficient detail for general design understanding. Those criteria set forth the function, general description, major component description, system and major component design parameters, and system operational modes for normal, emergency, and accident conditions. 8

17.1.3.1.3 Procurement Specifications

Specifications define all design and quality assurance requirements to be fulfilled by the supplier to achieve appropriate design quality (where design activities are involved) and product quality. They define all criteria and information necessary to provide a complete basis for design and fabrication by the supplier. The content of these specifications is subject to the control measures of paragraph 17.1.4. The Division of Purchasing does not specify or interpret quality or quality assurance requirements or make quality related decisions. The organization that initiates the procurement is responsible for quality and quality assurance requirements and interpretation. 8 9

Where the supplier performs design activities which require verification by TVA before release for manufacture, evidence of TVA approval is indicated by the use of the conventional TVA approval stamps by the responsible Nuclear Engineering organization. 9

17.1.3.2 Interface Control

DNE employs an internal review process to assure that DNE documents such as drawings, specifications, and externally generated documents such as manufacturers' drawings or specifications are reviewed to ensure structures, systems, and components are compatible geometrically, functionally, and with processes and environments. The review process involves all DNE organizations affected by, or concerned with, the documents. 9 9

17.1.3.2.1 Internal Interface Control

Responsibilities of each division and branch within DNE are described in DNE program documents. Any design activity or any design document (drawings, construction specifications, criteria, procedures, SAR input, etc.), which interfaces with or affects the responsibilities of more than one DNE organization is coordinated by the initiating organization to the extent necessary to assure a completely integrated design. All design criteria documents, drawings, specifications, and procedures are formally routed by the initiating organization in accordance with written procedures or by way of memorandum or design review meetings to assure proper control of interface reviews. Initials on the issued document or coordination sheets indicate that the interface reviews have been made. 9 9 8

17.1.3.2.2 External Interface Control

Most external interfaces are with the NSSS supplier and with other suppliers of equipment. Specifications and contract documents define supplier responsibilities for submittal of necessary information for control of interfaces with TVA design. Each contract for equipment, including the NSSS, is assigned to a group or section within DNE which is responsible for control of design interfaces with the contractor. The responsible organization assures that proper supplier submittals are available for review in accordance with written procedures for all affected organizations. 3 9 3

For major suppliers, such as the NSSS, the responsible organization develops written procedures for handling correspondence, telephone conferences and meetings. All meetings and conferences of significance are documented and the documentation is sent to the affected organizations. The responsible organization assures adequate representation at meetings, and that questions regarding interface are properly resolved.

Interfaces on quality matters with other divisions in TVA are controlled by written procedures. 9

17.1.3.3 Design Verification

Design control measures are provided for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Design verification will be complete prior to fuel load of the respective unit for each plant under construction, or in the case of an operating plant, prior to relying on the component, system, or structure to perform its function. 9

17.1.3.3.1 Design Review

Review of design documents is performed in accordance with written procedures. These procedures require that the document be reviewed by qualified engineers other than those preparing the design information being reviewed. The immediate supervisor may participate in these reviews but will not be a sole reviewer nor lead a review team where independent review is required of a design for which he was the immediate supervisor. These reviews are performed by engineers experienced in the aspect of design being reviewed. The responsible engineer or designated reviewer for a given design document is responsible for assuring that the review is complete. These reviews include review to assure that 9

appropriate inspection and test criteria are specified in the design document by reference to appropriate codes and standards and supplemented as necessary by TVA requirements.

Separate procedures control preparation and approval of design input documents, calculations, associated computer programs and design output documents. The design review procedure provides for the required reviews of all design documents. The design review performed on design documents includes a review to assure that the design provides for a completed product to be controlled, inspected, and tested as required to assure that the product will meet all requirements.

The assignment of responsibility and authority for design review is controlled through procedures, in accordance with procedural instructions and guidelines. Branch chiefs and project engineers (or their designees) identify individuals or organizations responsible for performing design reviews, and assure the design reviewers are adequately informed of their responsibility and authority for their respective areas of review, and define the scope of each design review to assure coverage of all safety-related aspects of the design.

Designated reviewers perform the reviews or assure adequate reviews are performed and indicate their approval by affixing a legible signature or identifiable initials on the design documents. Design reviewers have authority to approve or disapprove the design documents in their area of review in accordance with the guidelines established by the branch chiefs or project engineers.

Design drawings are checked by experienced design engineers other than those who prepared the original. Basic design drawings which may be prepared by the engineers such as design criteria diagrams or flow diagrams, control diagrams, logic diagrams, and single-line diagrams are reviewed by engineers other than the preparer to determine that they meet the design bases, and design criteria, and other design input requirements.

Procedures for review of specifications for procurement of equipment require that the review include a determination that adequate quality assurance requirements are specified and include design control requirements. Most components procured by TVA are standard components designed and fabricated in accordance with established codes and standards with a history of proven design. Under existing codes and standards, confirmation is required by the specification that design computations have been made and reviewed.

Calculations, test procedures, and test results are reviewed as necessary to demonstrate compliance with requirements.

Manufacturers' drawings, inspection and fabrication procedures, and performance test results are reviewed for conformance with contract requirements.

17.1.3.3.2 Alternate or Simplified Analyses

Alternate and simplified analyses are used where the accuracy of the calculations is essential to plant safety and where the analyses are exceptionally complex or require new and unproven methods or when the analysis cannot be verified by test.

Alternate or simplified analysis may be selected by a reviewer in lieu of a detailed review of the original calculations.

17.1.3.3.3 Verification Tests

Specifications for procured equipment require that the manufacturer verify the integrity and performance of equipment in accordance with codes and standards applicable to the equipment being furnished. When tests are required, records of the test results are also required. The more important tests are witnessed by TVA representatives. Performance tests for items under TVA design responsibility are reviewed by TVA design engineers to assure that they meet requirements.

Seismic testing is required by specifications where analysis cannot demonstrate adequacy of equipment to meet seismic requirements. Combination of loads are specified to demonstrate adequacy of equipment under required conditions of performance. Seismic test procedures (except those reviewed by the NSSS supplier) and test results are reviewed by TVA design engineers.

Preoperational and startup tests are planned, reviewed, conducted, and results approved in accordance with written procedures which assure a systematic and orderly program of testing to verify that component, system, and plant performance meet all requirements.

17.1.3.4 Design Changes

Design changes, including field-initiated changes, are controlled by written procedures. The controls applied for changes are commensurate with those applied for the original design.

17.1.4 Procurement Document Control

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17.1.4.1 Procurement by DNE

TVA procurement documents are prepared by procurement group personnel in the responsible project engineer's organization. Before release of the documents they are reviewed by DNQA to see that they meet technical and quality assurance requirements.

The reviewer's signature signifies that a review has been performed by him and/or by other qualified persons for verification that quality requirements are correctly stated, inspectable, and controllable; there are adequate acceptance criteria; the procurement document has been prepared, reviewed, and approved in accordance with quality assurance program requirements; and that applicable regulatory requirements, design bases, and appropriate requirements for design and/or product quality are included. Procedures provide for the internal review and approval of DNE procurement documents and safety-related changes to verify that supplier quality assurance requirements are suitably included or referenced and that this review and approval be completed and documented before their release. Procurement specifications prepared by the NSSS supplier which include quality assurance requirements are also reviewed by TVA on a selected basis to assure that they comply with basic criteria including quality assurance.

Procedures require that procurement documents identify the applicable requirements of ANSI N45.2. These requirements are identified using the methods defined in section 6 of the appendix to ANSI N45.2.13, "Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants." Section 17.1.7.1 describes the measures for source evaluation and selection, which includes approval of the Quality Assurance Program of the NSSS supplier and other TVA contractors.

Review of procurement documents for technical and quality assurance requirements includes review for material identification requirements, test and inspection requirements and special process instructions for such activities as welding, heat treating, nondestructive examination, and cleaning. Procurement documents are reviewed to assure they identify the documentation (e.g. drawings, specifications, procedures, inspection and fabrication plans, inspection and test records, personnel and procedure qualifications, and material, chemical and physical test results) to be prepared, maintained, and submitted to TVA for review and approval, and to assure they identify those records which shall be retained, controlled, maintained or delivered to TVA before use or installation of the hardware.

TVA procedures require that changes and revisions to procurement documents be subject to the same review and approval requirements as the original document.