

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.

7

### 17.1.2 Design and Construction Quality Assurance Program

The quality assurance program is governed by management policies and requirements that include the Interdivisional Quality Assurance Procedures and the Program Requirements Manual which are maintained and controlled by the Division of Quality Assurance.

8

#### 17.1.2.1 Scope

The quality policies, manuals, and approved procedures comprise the documented quality assurance program of the Offices of Engineering and Construction which are implemented during design and construction to assure that the resulting TVA nuclear plant can be safely operated. These items are mandatory as established by policy set forth by the Managers of the Offices of Engineering and Construction.

8

8

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:

<u>Nuclear Plant</u>	<u>Table No.</u>
Yellow Creek (YCNP)	17C-1
Hartsville (HNP)	17C-2
Bellefonte (BLNP)	17C-3
Watts Bar (WBNP)	17C-4

1

7

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

7

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.

7

Quality assurance program controls over safety related site preparation are provided by Engineering Procedure 'Soil and Rock Investigations,' which distributes responsibilities among the various TVA organizations involved.

8

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

8

#### 17.1.2.2 Quality Assurance Program Documentation

The quality assurance program is documented by approved policies and procedures. TVA will follow the guidance of NRC Regulatory Guides as described in the tables 17D-1, Appendix D, for B1NP, HNP, YCNP; and 17D-2, Appendix D, for WBNP.

7

Tables 17B-3 and 17B-4 contain a list of procedures and the criteria of Appendix B to 10 CFR 50 which they implement for the Offices of Engineering and Construction, 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. DQA is responsible for assuring by audit or surveillance that these procedures are updated to reflect changes in this topical report.

8

7

8

7A

8

#### 17.1.2.3 Indoctrination and Training

An indoctrination and training program for personnel performing quality related activities provides for:

7

- (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 of personnel performing quality related activities in the principles and techniques of the activities they perform.
- (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.

Indoctrination and training practices of Offices of Engineering and Construction are as follows:

Office of Engineering

8

Office of Engineering personnel performing quality assurance/quality control activities are qualified through indoctrination and/or training. The responsibility for performing quality related activities is assigned only to qualified personnel.

7

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

8

The Office of Engineering Personnel Staff develops the training requirements matrix which relates individual quality assurance training requirements to specific job functions important to safety and develops proposed training program schedules, evaluation techniques, and identification of trainers and course content.

8

7

Office of Construction

8

Indoctrination, instruction, training, and qualification of CONST personnel who perform, verify, and/or assure quality-related activities is accomplished in accordance with the CONST 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 QC inspectors and selected craftsmen. The manual defines responsibilities for implementation of the training program and the record requirements.

7

17.1.2.4 Quality Assurance Program Implementation

7

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

Statements of Policy  
Administrative Instructions  
Job Descriptions for Management, Professional, and  
Technical Personnel  
Quality Assurance Procedures  
Quality Control Procedures  
Purchasing Procedures  
Engineering Procedures  
Inspection and Testing Procedures  
Construction Procedures

8

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 office, quality assurance personnel have access to them and can request to review and direct changes to them. These documents are maintained in accordance with approved procedures.

7

8

7

The Office of Engineering and the Office of Construction prepare and maintain quality assurance 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.

8

7

The programs include several separate manuals which contain procedures that prescribe the methods for controlling and the steps in achieving the many specific CONST and Office of Engineering quality related activities. A separate Interdivisional Quality Assurance Manual defines responsibility for and the steps taken in achieving the activities conducted jointly by interfacing between offices. Controlled copies of appropriate manuals are issued to the individuals in organizations performing activities affecting quality.

7

8

8

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. DQA has final authority for resolution of quality assurance disputes over interpretations of QA requirements.

8

Office of Engineering

The Office of Engineering 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, surveillance, and verification of supplier activities including evidence of required quality.

8

8

Office of Construction

CONST procedures provide for control of documents, materials, inspections, tests, and test equipment, 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 Office of Engineering.

8

7

8

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.

Deferred Nuclear Units (Construction)

The construction quality assurance program for the deferred nuclear units (Hartsville and Yellow Creek) responds to the requirements of Appendix B to 10 CFR Part 50 and the existing program with appropriate modifications. The planned work force reduction and production stoppage has caused significant modification to the organization descriptions and the production supporting portions of the quality assurance program. Those elements of the existing program are maintained to prevent degradation of quality of safety-related structures, systems, and components.

8

The existing quality assurance program document network remains intact, with some modifications for quality-affecting activities such as receiving, storing, maintaining, and inspecting. The program continues to be delineated in the Construction Engineering Procedures (CEP), Quality Control Instructions (QCI), and Receiving, Storage, and Preventive Maintenance Instructions (RS and PMI). 'Access Control' is delineated in the document referred to as the 'Joint Security Plan for Nuclear Plants.'

The requirements for personnel qualification and training are delineated in the 'CONST QA Indoctrination, Training, and Qualification Program.' This plan addresses the indoctrination, instruction, qualification, and training for personnel performing, verifying and assuring quality assurance activities.

8

The 'as-constructed' status at point of deferral is recorded on appropriate drawings maintained at the site. CEP-33.03, 'As-Constructed Drawings,' reflects this requirement for deferred nuclear units.

#### 17.1.2.5 Program Assessment

The scope, status, adequacy, and compliance of the quality assurance programs with 10 CFR 50, Appendix B, will be regularly assessed and reported to appropriate levels of TVA management and the TVA Board of Directors on a periodic basis. This assessment is compiled by DQA through the receipt and analysis of progress and status reports from performing units of the TVA organization through meetings, audits, and Trend Analysis Reports. In addition, DQA 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.

8

7

7A

8

#### 17.1.3 Design Control

Design controls specified in the Office of Engineering 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.), and operation requirements (access, inspection, maintenance, and repair, etc.).

8

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.

7

### 17.1.3.1 Design Documentation

7

#### 17.1.3.1.1 Preliminary Design

Preliminary design responsibilities are assigned to a lead branch designated by the Manager of Office of Engineering.

8

Responsibilities for engineering and design for all divisions, branches, and groups within Office of Engineering are defined in the Office of Engineering Administrative Instructions and are not altered by this lead branch responsibility. The lead branch responsibility is an integrated project-type responsibility to assure effective and timely coordination, communication, and integration of activities among various groups in the Offices of Engineering, Construction, and Nuclear Power, and the NSSS supplier during the preliminary engineering and design phase of the project.

8

This responsibility is assigned to qualified engineers from various engineering disciplines, and to specialists in various areas who are temporarily assigned by other organizations within Office of Engineering.

The lead branch obtains additional engineering and design assistance of other organizations within Office of Engineering 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. At an appropriate time in the preliminary design process, the lead branch responsibilities are transferred to the Engineering Projects and other Office of Engineering branches.

During the preliminary design phase, the lead branch is responsible for the following associated tasks.

(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 Office of Engineering organizations and the NSSS supplier) is developed in a timely manner.

8

(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.

| 8

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

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

These assigned responsibilities assure that the Engineering Project, 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

| 7

Basic design criteria are developed by responsible discipline branches in the Division of 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.

| 8

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

| 7

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 division that initiates the procurement is responsible for quality and quality assurance requirements and interpretation.

8

7

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 Office of Engineering branch.

#### 17.1.3.2 Interface Control

7

Office of Engineering employs an internal review process to assure that Office of Engineering documents such as drawings, specifications, and externally generated documents such as manufacturers' drawings or specifications are reviewed for interface compatibility by all Office of Engineering organizations affected by, or concerned with, the documents.

#### 17.1.3.2.1 Internal Interface Control

8

7

Responsibilities of each division and branch within the Office of Engineering are defined in the Office of Engineering Administrative Instructions. 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 Office of Engineering 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.

8

#### 17.1.3.2.2 External Interface Control

7

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 the Office of Engineering which is responsible for control of design interfaces with the contractor. The responsible organization assures that proper supplier submittals are available for the model review or squad check in

8

8

8

accordance with written procedures for all affected organizations.

For major suppliers, such as the NSSF, 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. External interfaces on quality matters with other divisions in TVA are controlled by management policies and requirements.

#### 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. Unless otherwise specified in appropriate design documents, the design review method will be used.

##### 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 or 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 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 documents such as drawings, calculations, design criteria, SAR input, ASME Code Design Specification, purchase requisitions and specifications, and construction specifications. Comparable procedures are used to control alternate calculations and design verification tests. Each specific procedure provides for the required reviews. 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 (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 Managers.

Design drawings are checked by experienced design engineers other than those who prepared the original. Basic design drawings which may be prepared by the Engineering Project 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

##### 17.1.4.1 Procurement by Office of Engineering

TVA procurement documents are prepared by procurement group personnel in the responsible Office of Engineering branches. Before release of the documents they are reviewed by other engineers having specialized technical and quality assurance qualifications to see that they meet technical and quality assurance requirements.

The responsible branch chief (or his appointed representative) designates the group or person responsible for the review of procurement documents. The reviewer must be someone other than the person who prepared the document being reviewed or other than the preparer's immediate supervisor.

7

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 and rejection criteria; and the procurement document has been prepared, reviewed, and approved in accordance with quality assurance program requirements; 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 Office of Engineering procurement documents 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. All Office of Engineering nuclear plant requisitions and safety-related changes are approved for quality assurance requirements before 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.

8

8

Procedures require that personnel reviewing procurement documents for quality assurance requirements receive indoctrination and training in procurement quality assurance.

7

Regulatory Guide 1.28 states that the general requirements and guidelines of ANSI N45.2, 'Quality Assurance Program Requirements for Nuclear Power Plants,' provide an adequate basis for complying with the program requirements of Appendix B to 10 CFR Part 50. 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.

7

8

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, as required by contract, 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, and that procurement documents for spare or replacement parts during design and construction are subject to the same controls as the original equipment.

The organization originating the requisition is responsible for ensuring that the Management and Engineering Data System (MEDS) receives a complete set of records of the procurement excluding supplier records and receiving records which are the responsibility of QEB and the construction site, respectively. Specifications are an integral part of each procurement document. When the contract has been made, copies are distributed by Purchasing to Office of Engineering, CONST, DQA and accounting. These records are transferred to MEDS for entering in the MEDS system to provide current access and for storage. In the initial stages of a project, procurements for major equipment and long lead items are scheduled. Later all known procurements are placed on a schedule which is periodically updated and distributed. Numbers are cross-referenced to the procurement filing system so that determination can be made of the status of any item of procurement at any time. Office of Engineering's procurement schedule is issued to CONST and periodically revised and updated. Office of Engineering originates purchase requisitions (specifications) and distributes them to Office of Engineering, CONST, DQA, Purchasing, and accounting. Purchasing converts (without altering technical or quality assurance requirements) the requisition to an Invitation to Bid form and issues to the same organizations at time of advertisement.

#### 17.1.4.2 Procurement by Office of Construction

CONST procures permanent plant items or services in accordance with Office of Engineering approved procurement specifications. Specific guidelines for the control of CONST procurement have been established. These guidelines are incorporated in CONST Quality Assurance Procedure (CONST-QAP)

entitled Procurement Document Control, and CONST Quality Assurance Program Policy (CONST-QAPP), entitled Control of Purchased Material, Equipment, and Service. Procurements are initiated, reviewed, and approved by the CEO. In addition, they are reviewed and approved by the CONST Quality Manager Organization.

#### 17.1.5 Instructions, Procedures, and Drawings

Activities affecting quality are prescribed by documented instructions in the form of drawings, specifications, and procedures which include appropriate quantitative and qualitative acceptance criteria to verify that important activities have been satisfactorily accomplished. These documented instructions are followed for all activities affecting quality. The preparation, review, approval, and control of such procedures are in accordance with the requirements of CONST-QAPP, Instructions, Procedures and Drawings or the Engineering Procedures applicable to the type of instruction, procedure, or drawing being prepared.

Measures to assure documented instructions are provided for all activities affecting quality are described in the following paragraphs.

##### 17.1.5.1 Office of Engineering

Drawing and procurement schedules identify required drawings and procurement specifications. These schedules are reviewed by the Design Project for completeness and accuracy. Where changing requirements indicate that additional drawings or specifications are necessary, they are added to the schedules.

Construction specifications prepared by Office of Engineering and approved by Offices of Engineering and Construction provide for control of processes and for control of the quality necessary for the construction of safety-related items. These specifications identify (as applicable) the materials and requirements of the material to be used, the construction procedures, equipment, and details necessary for the construction or installation and any special requirements for handling and storage of expendable and consumable materials or equipment. Construction specifications also include applicable quality control inspection, test, and records requirements for expendable and consumable material.

Each design document including procedures, drawings, and specifications involving nuclear safety-related structures, systems, or components is independently reviewed by a qualified person other than the preparer.

All Office of Engineering nuclear plant requisitions and safety-related changes thereto are approved by the Office of Engineering QEB.

8

17.1.5.2 Office of Construction

CONST procedures for inspections, tests, calibrations, and special processes are independently reviewed by a person other than the preparer, who is qualified in quality assurance. The procedures are approved by appropriate levels of management before issue.

7

17.1.6 Document Control

The preparation, review, approval, and issue of documents (listed below) are controlled by means of procedures listed in Tables 17B-3 and 17B-4, Appendix B, to assure they are adequate and the quality requirements are stated.

7

- a. Procurement documents
- b. Design criteria documents
- c. Design, process, construction and procurement specifications
- d. Design, manufacturing, construction, and installation drawings
- e. Engineering and QA/QC procedures
- f. Manufacturing, inspection, and testing instructions
- g. Test procedures
- h. Nonconformance reports
- i. Design change documents
- j. Design calculations

The positions and groups responsible for reviewing, approving, and issuing the documents listed above are delineated by procedures. Changes to the documents are reviewed and approved before implementation by the same organizations unless delegated by appropriate management.

7

Prevention of inadvertent use of obsolete or superseded documents is controlled by the procedures listed in Tables 17B-3 and 17B-4, Appendix B.

7

The documents, including approved changes, necessary for the performance of quality related activities are required to be available at the work location before commencing work.

Organizations responsible for instructions, procedures, specifications, and procurement documents maintain master lists of such documents. These organizations are also responsible for updating and distributing the master lists to the predetermined responsible personnel using these documents. Table 17E-1, Appendix E, contains a list of manuals relating to quality affecting and quality assurance activities during design and construction of nuclear power plants. Distribution of these manuals to those individuals who have a need to know the material contained in the manuals is assured by controlled distribution procedures. Uncontrolled copies are so designated and not used in actual work. Revisions are sent to individuals having controlled manuals and it is the responsibility of each such individual to assure the revisions are inserted in his manual.

7

7

#### 17.1.6.1 Office of Engineering Documents

3

Procurement document control is covered in paragraph 17.1.4.

7

Office of Engineering maintains a complete, numbered, scheduled, and descriptively titled list of drawings. A complete record of completion date, issue date, revision date, and responsible design section is maintained for each drawing. The drawings' schedule is also issued to CONST and periodically revised and updated. Each drawing needed for construction, as completed and issued, is transmitted to CONST with a standard receipt form. CONST signs, dates, and returns a copy of the form to Office of Engineering as proof that each drawing was received. Each drawing revision is handled in like manner.

8

8

Documents, including changes, are reviewed for adequacy and approved for release in accordance with Engineering Procedure 'Control of Documents Affecting Quality.'

#### 17.1.6.2 Manufacturers' Drawings and Instruction Manuals

7

Records are maintained by Office of Engineering covering the receipt and handling of manufacturers' drawings, instruction manuals, and other data. Records include number identification,

8

title or description, date received, interbranch handling, status by TVA (approval, conditional approval, returned for correction, or information only), distribution, and dates of actions. Subsequent revisions, if any, are handled in like manner.

Manufacturers' drawings and manuals are marked with their approval status or for information and distributed simultaneously (by copy of letter to manufacturer) to CONST, Office of Engineering, and NUC PR. CONST stamps, signs, dates, and returns a copy of the acknowledgement letter to Office of Engineering as proof that transmittals were received.

8

8

### 17.1.6.3 NSSS Supplier Documents

These records identify each piece of information by:

- Contract number.
- Drawing or document number.
- Unique component number.
- Title.
- Applicable revision.
- Correspondence transmitting this information between the NSSS supplier and TVA.
- Status of approval by TVA.

8

These records also indicate which Engineering Branches reviewed each revision of a piece of information along with the distribution of each revision of this information to CONST, NUC PR, the Engineering Branches and the Engineering Project.

8

The reproducibles of all NSSS supplier furnished information are stamped to indicate the approval status as determined by the responsible organization for Office of Engineering. Copies of this information for distribution are made from the stamped reproducible.

8

8

Office of Engineering distributes approved NSSS supplier information by copy of the acknowledgement letter to the NSSS supplier, to CONST, QEB, NUC PR, and PURCH. CONST acknowledges receipt of the information by returning to Office of Engineering a receipted copy to the TVA acknowledgement letter. This same procedure is used on all revisions of a particular piece of information.

8

8

Distribution is made in like manner to other design branches and TVA offices and divisions whose responsibilities require their knowledge of NSSS supplier's design and fabrication of systems and components to assure compliance with TVA designed systems, components, and structures.

8

#### 17.1.6.4 CONST Document Control

7

Documents transmitted to the field construction organization will be in accordance with the preceding paragraphs of this section. Upon receipt, the documents will be controlled in accordance with established procedures.

The CONST quality assurance program requires that:

1. Provisions shall be delineated in procedures/instructions to control the issuance of documents that prescribe activities affecting quality.
2. Documents prepared by CONST shall be reviewed for adequacy and approved by authorized organizations for issuance and use at locations where the prescribed activity will be performed before the activity is started.
3. Provisions shall be established, delineated, and executed to preclude the use of obsolete or superseded documents at locations where the prescribed activities are being performed.
4. An updated document list or equivalent shall exist to assure that obsolete or superseded documents are replaced in a timely manner by updated applicable document revisions.
5. Document revisions shall be reviewed and approved by the same organizations that performed the original review and approval unless delegated by the originating organization to another responsible organization.

7

Documents generated or used in the field such as the following are controlled by approved procedures.

- Specifications
- Drawings, including as-constructed drawings
- Procurement Documents
- QA Manuals
- Inspection, Examination, and Testing  
Procedures/Instructions
- Fabrication, Installation, and Erection  
Procedures/Instructions
- Field Change Requests
- Nonconforming Condition Reports
- Safety Analysis Reports

17.1.7 Control of Purchased Material, Equipment, and Services

17.1.7.1 Source Evaluation and Selection

Proposals (bids or quotations) by suppliers are reviewed to ensure that no exceptions are taken which would violate safety or quality requirements. The TVA specification requirements and the supplier's quality assurance plan are reviewed to be certain that his quality assurance program fulfills TVA specification requirements. Evaluation of contractor quality assurance programs is made by DQA and awards are made only to qualified suppliers. Those TVA contracts which provide for inspection provide access by TVA inspectors to applicable areas of a supplier's or subtier supplier's plant and access to any associated records. The determination that a supplier is qualified is normally based on evaluation of the supplier's performance on previous TVA contracts. When a prospective supplier has had no previous contracts with TVA, a review is made by TVA of his experiences, capability, facilities, quality assurance program and previous performance. Information available from the Coordinating Agency for Supplier Evaluation (CASE), ASME certificates of authorization, ASME Quality System Certificates and the Nuclear Regulatory Commission Office of Inspection and Enforcement White Book also may be used for evaluation of suppliers.

Standard 'off the shelf' commercial or previously approved material, parts, and equipment that are essential to the safety related functions of structures, systems, and components are reviewed for suitability of application before selection of the item and its supplier.

The quality assurance program descriptions of the NSSS supplier and other TVA suppliers are received by the Technical Engineer. The Technical Engineer has full responsibility for fulfillment of all technical aspects of the contract including quality assurance. Prior to award of contract, the quality assurance program is reviewed by DQA to determine if it meets requirements of 10 CFR 50, Appendix B, other regulatory requirements, and TVA contract requirements relative to quality assurance. This review is performed by personnel who are qualified to perform such reviews and who understand and are familiar with quality assurance requirements of TVA, NRC, ASME, and ANSI. After review and resolution of comments, the quality assurance program is approved by DQA. The engineering organization's approval is contingent on approval by DQA. DQA participates in the selection and review and approval of suppliers by reviewing quality assurance program descriptions and/or quality assurance manuals submitted for bid evaluation. Comments are sent to the cognizant engineering personnel and followed up for resolution.

8

8

8

Procedures require that a written recommendation for award be provided by the procuring branch to PURCH in accordance with administrative instructions before award of any contract which requires the supplier to have a quality assurance program (regardless of dollar value). Procedures provide for the Office of Engineering recommendation of award to reference evidence of approval of the bidders quality assurance program by DQA.

In the case of procurement by CONST, awards are made only to suppliers who have been approved by DQA. The selection of suppliers is also approved by the appropriate CONST Quality Manager's Organization.

8

#### 17.1.7.2 Audits of Suppliers

7

Audits of selected suppliers' quality assurance programs are planned, conducted, and reported by DQA.

8

#### 17.1.7.3 Surveillance at Supplier Plants

8

The Quality Engineering Branch has regional offices in major manufacturing regions. These regional offices are provided with documents and their latest revisions covering items pertaining to the contract requiring surveillance.

8

TVA representatives perform surveillance during material processing which consists of checks, reviews, verification, examinations, and witnessing of activities related to the fabrication and testing of material. Records, qualifications, and process specifications or procedures are verified to be in accordance with contract requirements.

Quality control inspection is provided by the supplier's inspection personnel. A supplier is required by the TVA contract to have a quality assurance program that meets pertinent requirements of 10 CFR 50 Appendix B as identified in the contract specification. Any supplier required to meet Criterion X 'Inspection' of 10 CFR 50 Appendix B would be required to have inspectors verify process controls if direct inspection were not possible.

8

8

TVA representatives performing surveillance receive instructions from procurement documents, QEB staff engineers in the central office, and from engineers in the engineering branches through the QEB staff engineers. Specific guidance relative to the nature and extent of inspections is given to the TVA representatives in the form of verbal and written instructions by engineers in the central office. Additional instructions, when required, are obtained from the Technical Engineer by the QEB Staff.

Source surveillance and assessment of objective evidence of quality are performed in accordance with Engineering Procedures which cover surveillance for various types of items and services: (1) 'Release of QA Items From Supplier's Shops to Construction Site,' including the 'TVA QC Checklist and Shipping Release' form which gives complete identification of the purchased item and identification of any procurement requirements which have not been met, and (2) 'Supplier Nonconformances-Handling.' Procedures require that:

- (1) Inspection activities shall be procedurally controlled.
- (2) Inspection procedures or instructions shall be available with necessary drawings and specifications for use before performing inspection operations.
- (3) The procedures, instructions, and/or drawings, including revisions, supporting the inspection activity shall be documented.

Indoctrination and training programs for TVA inspectors stress the need to follow procedures and to utilize the necessary documents supporting the inspection activity. Audits verify the adequacy of the surveillance programs and activities and their implementation.

The procurement engineer, responsible for analyzing bids on a contract, will review inspection requirements during bid analysis and will mark a copy of 'TVA QC Checklist and Shipping Release' form indicating the extent of inspection activities required.

The TVA representative shall, through surveillance and review, determine:

- a. that the material or equipment supplied meets requirements of the contract, specifications, approved drawings and procedures;
- b. that all required tests, inspections and examinations have been conducted and documented;
- c. that nonconformances have been corrected, resolved, or dispositioned;
- d. that the 'TVA QC Checklist and Shipping Release' forms are properly completed before release of shipment.

The frequency of QEB personnel visits to a supplier are predetermined and conducted as required to accomplish the above. QEB periodically evaluates the validity of supplier's certificates of conformance and the quality of the purchased product throughout the manufacturing process. These inspections are documented in accordance with Office of Engineering Procedures. | 8

If a disagreement should arise over nonacceptable items, the TVA representative notifies the Chief of Quality Engineering Branch who confers with the supplier's management to correct or replace the nonacceptable items. Any matter which cannot be resolved is referred to the TVA Contracting Officer who makes final resolution based on instructions from the responsible Technical Engineer.

In cases where equipment is procured by a TVA prime supplier (such as the NSSS supplier), for use in TVA systems or plants, the procedures are the same as those described above, except that: | 8

(1) The initial plant visits are coordinated with the prime supplier's quality assurance representative.

(2) The prime supplier has the responsibility for determining that test records are reviewed completely. TVA performs additional checks to determine that these reviews are made.

(3) Supplier or sub-tier supplier record systems are reviewed and checked to determine that necessary records are or will be available. In case of nonconformance, the TVA representative reports the deficiency to the central office and NSSF supplier quality assurance representative.

| 8

Nonconformance reports and associated corrective action are reviewed and approved by the Technical Engineer and the Chief, Quality Engineering Branch. Nonconformances resulting in monetary changes of contract are coordinated and approved through PURCH.

| 7

17.1.7.4 Examination Upon Delivery

Examination upon delivery is performed in accordance with written inspection instructions which describe measures that assure receiving inspection of material, equipment, and services is performed in accordance with the following:

- a. The item is properly identified and corresponds with the receiving documentation.
- b. Inspection of the item and acceptance records is performed and judged acceptable in accordance with predetermined inspection instructions, before installation or use.
- c. Documentation such as inspection records, certificates of conformance, or quality assurance releases, attesting to the acceptance of material, components, and equipment shall be available at the nuclear power plant before installation or use.
- d. Items accepted and released are identified as to their inspection status before forwarding them to a controlled storage area or releasing them for installation or further work.
- e. Nonconforming items are segregated, where practical; controlled; and clearly identified until proper disposition is made.

| 7

| 7

| 7

17.1.7.5 NSSS Supplier

| 8  
| 8

The NSSS supplier is required by contract to make the following provisions.

(1) TVA representatives have specified access to plants furnishing NSSS materials and equipment.

(2) TVA has review or approval rights as delineated in the Scope of Supply of specifications, drawings, procedures, and other design information on equipment and systems in the NSSS.

| 8

(3) The NSSS supplier provides instructions and direction for erection of the NSSS.

(4) The Scope of Supply defines in detail the systems and components for which the NSSS supplier and TVA are responsible.

| 8

(5) NSSS design changes affecting warranties, technical soundness, or operability of the plant cannot be made by the NSSS supplier without agreement by TVA.

| 8

(6) All first-tier suppliers are approved by TVA.

(7) TVA, with cooperation of the NSSS supplier, conducts special field tests to demonstrate compliance of equipment with specifications.

| 8

(8) The NSSS supplier is required to design, fabricate, and test all equipment to the applicable codes and other design requirements for each component.

| 8

(9) The NSSS supplier has its own quality assurance program (as described in section 17.1B of the appropriate SAR) which is designed to ensure that all work and material furnished meet requirements for quality as defined in this section.

| 8

17.1.8 Identification and Control of Materials, Parts, and Components

| 7

17.1.8.1 Office of Engineering

| 8

Office of Engineering includes in procurement documents requirements for identification and control of materials, parts, and components. The effectiveness of supplier's identification and control measures is determined through surveillance conducted by representatives of Office of Engineering.

| 8

Office of Engineering requires identification and control of certain site material, parts, and components on specifications and drawings provided to CONST. These requirements are intended to prevent the use of incorrect or defective items where specific instructions are required.

| 8

For Bellefonte and later plants a unique number is assigned to components and system functions on TVA drawings in accordance with a Unique Identification System (UNID). This UNID system is used in all phases of project management (cost, scheduling, operation, etc.) and to enhance retrieval of quality assurance records.

#### 17.1.8.2 Office of Construction

| 8

As required, materials, parts, and components are identified by heat number, lot number, unique serial number, or other means appropriate to their importance to safety. This identification is maintained, as required, throughout fabrication, assembly, installation, and use. Where size and accessibility permit, the identification will be on the item but such as not to interfere with the performance characteristics of the item. In other cases the identification will be maintained on records traceable to the item such as by installed location of small or finally inaccessible parts, or by general location of concrete and embedded materials and parts therein.

Detailed procedures provide means of assessing acceptability of items before higher assembly stages to verify acceptance status and to prevent the inadvertent use of incorrect or defective material and assemblies.

#### 17.1.9 Control of Special Processes

| 7

Suppliers are required to submit to TVA for approval, procedures as specified by contract for qualification and certification for special processes personnel, as well as the procedures for the performance of special processes. TVA audits the suppliers to assure the compliance with the procedures of the applicable codes, specifications, and standards. Qualification records are identifiable and retrievable for both personnel and procedures.

| 7

TVA quality assurance/quality control procedures require that special processes are controlled and accomplished by qualified personnel using qualified written procedures. Special processes include, but are not limited to welding, heat treating, nondestructive testing, and fluid handling piping and component cleaning.

| 7A

These special processes shall be accomplished with written process control documents such as work packages, process sheets, shop procedures checklist, or travelers with recorded evidence of verification. TVA procedures require that certification records of processes and personnel qualification shall be kept current and shall be available for review.

Special processes shall conform with applicable codes, standards, specifications, criteria, and other special requirements. Results of special process activities are documented to provide evidence of verification.

#### 17.1.10 Inspection

7

Inspections and tests are performed with appropriate equipment and under suitable environmental conditions.

Inspection procedures, instructions, and/or checklists of suppliers and TVA Office of Construction contain the following:

8

- a. Identification of characteristics to be inspected.
- b. Identification of the individuals or groups responsible for performing the inspection operation.
- c. Acceptance and rejection criteria.
- d. A description of the methods of inspection.
- e. Verification of completion and certification of inspection.
- f. A record of the results of the inspection operation.

TVA inspection procedures require that modifications, repairs, and replacement items during design and construction are inspected to the same requirements as the original items, or approved alternates.

For safety-related construction activities subject to the ASME Code, an inspection hold-point is identified by a mark on a process control document which indicates that an Office of Construction inspector and/or the Authorized Nuclear Inspector must witness, verify, or conduct an examination before the work can proceed to the next operation.

8

For safety-related construction activities which are non-ASME Code, inspection hold-points are identified in the site Quality Control Procedures and indicate that an Office of Construction inspector must witness, verify, or conduct an examination before the work can proceed to the next operation.

| 8

In both cases above, hold-points are documented, signed off and dated by the inspector to provide records and quality status.

17.1.10.1 Office of Engineering

| 8

The program for the inspection of procured items is described in paragraph 17.1.7.

| 7

17.1.10.2 Office of Construction

| 8

Quality Control inspections are performed in the field by qualified personnel during such construction quality affecting activities as receiving, storage, fabrication, erection, installation, and testing.

| 7

The function of the quality control personnel is not a production nature. They are qualified personnel who verify by visual, measurement and/or testing methods that an activity has been correctly or incorrectly performed and provide formal acceptance or rejection. The quality control personnel are independent of the personnel directly responsible for performing the specific activity.

| 7

This is a completely separate line of responsibility from that of the craftsmen and their foremen who report through a chain of command to the Construction Superintendent and are responsible for production and production type inspection.

Quality control personnel are allowed complete freedom to inspect for any deviation from design specifications and applicable codes; they have the authority to interrupt the work at any time and to require that corrections be made. This authority extends over any contractor working at the site. Unit personnel verify fitup, alignment, dimensions, materials and determine conformance to the proper procedures, specifications, and drawings. They also make cleanliness inspection of piping systems and observe the implementation of flushing and chemical cleaning procedures. Specific inspection activities are prescribed by individual construction procedures.

| 7

| 7A

In addition to the inspection function of the quality control personnel, certain inspection services are provided by contracted personnel under surveillance of the cognizant engineering unit. Such purchased services include nondestructive testing and third-party inspection.

7

The CONST quality assurance program requires that:

8

- (1) Inspection activities to be procedurally controlled.
- (2) Inspection procedures or instruction to be available with necessary drawings and specifications for use prior to performing inspection operations.
- (3) The procedures, instructions, and/or drawings, including revisions, supporting the inspection activities to be documented.

Indoctrination and training programs for inspectors stress the need to follow procedures and to utilize the necessary documents supporting the inspection activity.

7

#### 17.1.11 Test Control

The test program implemented during the design and construction phases includes those tests necessary to verify the adequacy of equipment and component design (design qualification), their proper fabrication and assembly (product acceptance), and the adequacy of field erection and installation (construction testing).

The written test procedures for design verification and product acceptance testing are prepared by the suppliers in accordance with the instructions of the procurement specification. The areas to be considered in the procurement specification preparation are addressed in the engineering procedures on the preparation and review of procurement specifications. The responsible procurement engineer coordinates a review performed to confirm that written test procedures are incorporated or referenced, as applicable. This review assures that the following items are correctly specified:

- (1) Acceptance limits
- (2) Necessary instructions for performing the test
- (3) Use of calibrated instrumentation
- (4) Adequate and appropriate equipment
- (5) Qualified personnel
- (6) Environmental conditions
- (7) Mandatory hold points
- (8) Adequate provisions for recording and reviewing test results

The procurement engineer may delegate certain aspects of the review in order to more effectively address all of the applicable areas. The areas of mandatory inspection hold points and methods of documentation may be addressed as separate areas within the procurement specification.

#### 17.1.11.1 Design Qualification Tests

Equipment and component design is verified by design control methods defined in paragraph 17.1.3.3. Where testing is necessary as a method to verify design, a qualification test program is established by procurement specification which identifies the specific test requirements, test conditions, configuration of equipment or component subject to test, test responsibilities, and test reporting requirements. Design qualification or type testing is typically required for one of a kind, prototype, or first item only.

#### 17.1.11.2 Product Acceptance Tests

Where necessary, fabrication and assembly is verified by functional and other tests. Acceptance test requirements are defined in procurement specifications in terms of tests to be performed, test conditions, test responsibilities, test procedures required, test reporting requirements, and review and/or approval requirements for test procedures and results. These tests supplement specified inspection and examination requirements which verify materials and processes.

### 17.1.11.3 Construction Testing

Construction tests are tests performed on safety-related items to verify the adequacy of the installation to satisfy prerequisites to the preoperational test program. Construction tests include pressure and other integrity test; cleaning and flushing; and item checkout, initial operation, and adjustments. Office of Engineering provides to CONST test information, requirements and acceptance criteria in design documents. Office of Engineering reviews the construction testing program to determine that prerequisites for preoperational tests are correctly specified. The NSSS supplier provides instructions and directions, as required by TVA, for systems within the NSSS supplier's scope of supply.

Construction tests are generally component tests rather than system tests. Such tests are delineated in the Construction Test Procedures which are reviewed and approved by NUC PR and Office of Engineering before procedure implementation. Office of Engineering specifies which particular set of tests is required for each general type of component. Construction tests contain detailed instructions with checkoffs to document the various steps. Acceptance criteria are generally go-no-go.

The quality assurance program requires reviews of the construction test program by personnel from QMO to verify that required tests which were identified by CEO were performed and that the test results demonstrate that the tested components are acceptable.

When plant systems are transferred from CONST to NUC PR, the cognizant NUC PR test director reviews with CONST's representative any incomplete activities including required construction tests which have not been performed or are not complete. For cleaning, flushing, RC system hydro test and other construction tests involving interfaces with a system already transferred to NUC PR or when assistance from NUC PR is required in running the test, NUC PR has a more extensive involvement and reviews and approves the individual construction test procedure package before the test. For the cleaning, flushing, and RC system hydro test, they also review and approve the Test Results Package.

NUC PR provides test support, operation assistance, and services as needed; and assures that portions of transferred equipment or systems affected by the tests are maintained as stated in test procedure.

The activities of CONST, Office of Engineering and NUC PR are controlled by an interdivisional quality assurance procedure covering construction testing. The procedure establishes a Construction Test Manual which is prepared by CONST and approved by Office of Engineering and NUC PR, as mentioned above. It also requires that the results of the reactor coolant system hydro test be approved by Office of Engineering and NUC PR.

#### 17.1.11.4 Preoperational Tests

Preoperational tests are performed to verify that systems have been designed and constructed such that they will operate as intended.

(1) Planning and Procedures. Office of Engineering prepares preoperational test scoping documents which define the tests to be performed and the performance objectives on all systems designed by TVA. The NSSS supplier prepares instructions or test specifications for systems within its scope of supply. After proper approval, the test scoping documents, test specifications and instructions are issued to NUC PR and CONST. Final detailed procedures are prepared by NUC PR based on the test requirement documents. The detailed procedures are reviewed by the proper divisions in the Offices of Engineering, Construction and Nuclear Power, with selected tests being reviewed by NSSS supplier.

(2) Acceptance for Testing and Operation. The transfer of equipment as specified in interdivisional procedures consists of three steps. (a) The 'Release for Operation' permits initial operation of components. The initial operations period is that phase during which construction tests and other prerequisites to the preoperational tests are conducted. System status is defined as specified in approved construction procedures. (b) The 'Tentative Transfer' involves a complete system or subsystem and includes an itemized list of outstanding items that must be completed before NUC PR finally accepts the system. The completion of preoperational tests is included in the itemized list. This document defines the system status at the time of transfer. System status subsequent to this time is defined in clearance procedures, grounding procedures, jumper control logs, and trouble reports. A period of pretest checkout occurs after the tentative transfer and before the preoperational tests. A set of preoperational test record drawings defines the system status before the test. These drawings are reviewed by Office of Engineering to ensure that the system is in a configuration that is safe and that will not invalidate the test results. (c) After completion of the preoperational tests and correction of any deficiencies, the system is turned over to NUC PR for final acceptance and safe operation.

(3) Conduct of Preoperational Tests. Preoperational tests are conducted under the direction of NUC PR in accordance with the portion of the quality assurance program for operations described in Section 17.2.11. The NSSS supplier provides instructions and directions as required by TVA for systems within the NSSS supplier's scope of supply. CONST and Office of Engineering provide assistance as required.

(4) Evaluation of Results. Test objectives are defined by the test procedures so that final test results receive a preliminary evaluation on site at time of test by NUC PR and NSSS supplier. Design and construction engineers are available to assist with evaluation as needed. Questions regarding ability of equipment or systems to meet design requirements are referred to Office of Engineering for resolution. The completed preoperational test document identifies the system status. Test results are formally distributed to all parties. Office of Engineering approves all preoperational test results.

(5) Modifications. Modifications during the design and construction phase, including those needed to correct problems identified during preoperational testing, are accomplished through design changes which are documented on Engineering Change Notices (ECN's). These ECNs are initiated by Office of Engineering and during the review cycle a determination is made as to whether the applicable test requirement documents should be revised. In the event a test requirement document revision is required, it will be prepared by Office of Engineering following a review of the original test requirements and instructions and previous test results. Either a revised or a new test procedure or instruction will be prepared with approval noted by Office of Engineering to indicate that the instruction reflects the revised requirements. Resulting test data will be reviewed and approved by Office of Engineering. Where the Office of Engineering review of the ECN indicates that the modification does not impact previous test results, a revised document will not be required.

(6) Retesting. The adequacy of retesting performed as a result of replacement of identical parts or repairs is verified by an Office of Engineering review/approval cycle of the test results package when requested by NUC PR.

NUC PR revises or prepares new test procedures in response to revisions in test requirements documents by Office of Engineering. NUC PR identifies other retests necessitated by modifications by review of workplans and revises test procedures as necessary. Retests are conducted and results handled in the same manner as original tests.

### 17.1.12 Control of Measuring and Test Equipment (M&TE)

Tools, gauges, instruments, and other measuring and testing devices used in site construction activities are controlled, calibrated, and adjusted according to written procedures. These procedures establish the responsibilities and methods for control of this equipment and provide for the means by which periodic calibration and adjustment schedules are established. They also provide for the generation and maintenance of records that document these activities. Detailed procedures define the methods of calibrating and adjusting each item of this equipment and the standards to which they will be made.

Procedures require that calibration standards be traceable to the National Bureau of Standards, nationally recognized standards, or to accepted values of natural physical constants. Procedures also require that in the event test equipment is found to be out of calibration an evaluation will be made on work previously inspected with this equipment as appropriate to assure correctness of inspection results. Logs are maintained to document the use of measuring and test equipment.

Procedure 'Control of Measuring and Test Equipment' requires that: (a) measuring and test equipment be identified with a unique identifier and that this identifier be recorded on the calibration record for the equipment; (b) all measuring and test equipment be tagged to indicate date next calibration is due; (c) project procedures delineate calibration frequency based on the required accuracy, purpose, degree of usage, stability characteristics, and other conditions affecting the measurement; and (d) calibration standards have an uncertainty (error) requirement of no more than one fourth of the tolerance of the equipment being calibrated, with a greater uncertainty being acceptable when limited by the 'state-of-the-art.'

Written procedures require that procurement documents identify the applicable requirements of ANSI N45.2, 'Quality Assurance Program Requirements for Nuclear Power Plants,' 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.' Requirements TVA places on a supplier in the area of control of tools, gauges, instruments and other measuring and testing devices are identified in procurement documents by incorporating or referencing the applicable parts of ANSI N45.2.

17.1.13 Handling, Storage, and Shipping

7

Offices of Engineering and Construction procedures require that procurement documents specify special handling, preservation, storage, cleaning, packaging, and shipping requirements, and that these activities be accomplished by qualified individuals in accordance with predetermined work and inspection instructions.

8

Measures to provide control at the construction site are prescribed by Construction Quality Assurance Program Policy, 'Handling, Storage, and Shipping.' In rare instances where items are shipped from a construction site, special instructions are provided. CONST Warehouse Services Unit is responsible at the site for receiving and storing material and equipment in accordance with specification, code and manufacture requirements. The Quality Manager Organization is responsible for assuring that the quality of material and equipment is maintained from the time of receipt to transfer to NUC PR. Qualified personnel will implement written Quality Control Procedures which describe the procedures, check sheets, and documentation necessary to assure that the required operations are performed.

7

17.1.14 Inspection, Test, and Operating Status

7

Suppliers' programs are reviewed to determine that they include provisions for identification of the inspection, test and operating status of items is known throughout manufacturing; the application and removal of inspection and welding stamps and status indicators, such as tags, markings, labels, and stamps are controlled and not performed by personnel with cost and schedule pressures; bypassing of required inspection, tests, and other critical operations is controlled through documented measures under the cognizance of the supplier's quality assurance organization; and status of nonconforming, inoperative, or malfunctioning items be identified to prevent inadvertent use.

Activities onsite related to inspection and test status are controlled by approved procedures which require the following: identification of the inspection and test status of items is known throughout field fabrication and installation; bypassing of required inspections, tests, and other critical operations is controlled; the status of nonconforming, inoperative, or malfunctioning items is identified; application and removal of inspection and welding stamps and status indicators such as tags, markings, labels, and stamps are controlled.

8

The Quality Manager Organization (Construction Engineer Organization at deferred plants) is responsible for maintaining a list of required inspections and tests; maintaining the completion status of those required inspections and tests; performing those required inspections and tests; maintaining and issuing periodic reports of inspection and test status; and placing and removing any marks, stamps, and tags used to indicate status. The operating status is a joint effort between CONST and NUC PR and is controlled by interdivisional agreement.

7A

For ASME Code activities, the Office of Construction uses process control documents which are independently reviewed before the performance of work and are also reviewed by the Authorized Nuclear Inspector. These documents define the operations, inspections and tests required to perform the task and to assure compliance to specification requirements. The inspections are performed by an organization which is independent of the organization performing the work. The bypassing of any of these operations, inspections, or tests is controlled by a written quality control procedure.

8

#### 17.1.15 Nonconforming Materials, Parts, or Components

Requirements for determining, reporting, and correcting Conditions Adverse to Quality (CAQs) are specified in TVA management policies and requirements.

8

Those conditions adverse to quality (CAQs) identified as significant are immediately given to the Nuclear Licensing Section (NLS) within Office of Engineering (except for significant CAQs found at licensed units which are forwarded to the Site Director; see section 17.2). The CAQs are then reviewed to determine the effect of the significant deficiency on the safe operation of the nuclear plant if the deficiency were to remain uncorrected. The NRC is notified if this condition is determined to be reportable (i.e., has adverse safety consequences) and a written report is prepared and transmitted to NRC.

8

7

8

#### 17.1.15.1 Nonconformances - Reporting and Handling by Office of Engineering

A deficiency may be identified by any individual in the Office of Engineering. The deficiency is recorded on the Office of Engineering Nonconformance Report (NCR) form and reviewed by the responsible supervisor for determination that the deficiency meets or has the potential for meeting the requirements of a

8

nonconformance as defined in the applicable Office of Engineering procedure. When verified that the deficiency is a nonconformance, the supervisor immediately forwards the NCR form to his branch chief (or design project manager) for review for significance.

| 8

17.1.15.2 Supplier Nonconformances Handling by Office of Engineering

| 8

The controls applicable to suppliers are prescribed by the engineering procedure, Supplier Nonconformances - Handling. The requirements and methods of reporting nonconformances by Office of Engineering and handling those prepared by suppliers and CONSR are prescribed in Office of Engineering Engineering Procedure, 'Nonconformances - Reporting and Handling by EN DES.'

| 8

Nonconformance procedures require the use of a nonconformance report form which identifies the nonconforming condition 'describes the nonconformance, the disposition of the nonconformance, and the inspection requirements' and includes signature approval of the disposition. This form when completed provides the necessary documentation.

Suppliers are required to report a nonconformance immediately to TVA except when the recommended disposition is either 'scrap' or 'rework to original specification.' The QEB sends a copy of each supplier NCR to MEDS and reviews the NCR for significance in accordance with established procedures. The original nonconformance and one copy are routed to the Technical Engineer and copies distributed to other cognizant management, including the Director of Quality Assurance. Reviews and decisions as to disposition are made by those design engineers responsible for the original design. The responsible engineer reviews the proposed disposition and/or corrective action for either accepting or correcting the nonconforming item, for conformance to the latest design drawing, specification, and quality assurance requirements.

| 7

| 8

TVA controls relative to suppliers provide assurance that the supplier's quality assurance program meets the pertinent requirements of 10 CFR 50 Appendix B. These requirements are set forth in the TVA specification which is made a part of the contract with the supplier. The TVA specification would require that:

- (a) Nonconforming items are segregated from acceptable items and identified as discrepant until properly dispositioned.
- (b) Acceptability of rework or repair of items is verified by reinspecting and retesting the item as originally inspected and tested or by a method which is at least equal to the original inspection and testing method. Inspection, testing, rework, and repair procedures are documented.
- (c) Nonconformance reports dispositioned 'accept as is' or 'repair' are made part of the inspection records and forwarded with the hardware to TVA.
- (d) Corrective action is completed for significant nonconformances to preclude recurrence.

| 7

Significant trends of supplier nonconformance are included in trend reporting procedures (see Section 17.1.15.3).

| 7A

17.1.15.3 Trend Analysis by Office of Engineering

| 7

Trends are developed based on the review and analysis of source data such as nonconformances and documentation, personnel, equipment, and procedure deficiencies. Both the severity and the frequency of specific deficiencies are identified. Copies of the trend analysis reports are distributed to the appropriate Office of Engineering management.

| 8

| 8

17.1.15.4 Office of Construction

Measures to control nonconforming materials, parts, or components at the site are prescribed in an CONST Quality Assurance Procedure, 'Control of Nonconformance Reports.' This procedure includes means for identification, documentation, segregation, and disposition of nonconforming items and for notification of affected organizations to prevent their inadvertent use or installation.

At TVA facilities, each employee is responsible for identifying and reporting nonconformances. CONST Nonconforming Condition Reports (NCR) identify the nonconforming item, describe the nonconformance, describe the disposition of the nonconformance and include approval signature of the disposition. Until nonconforming items have been dispositioned as acceptable, the QMO and/or CEO identifies, segregates, or

| 7

| 7

otherwise controls such items to prevent unauthorized use. The CEO and/or the QMO also conducts a review of the nonconformance to determine the nature and severity of the nonconformance. Those nonconformances which can be made to conform to the specification or drawing requirements with additional work are dispositioned directly by the CEO. The CEO and/or QMO is responsible for reviewing all NCRs, identifying all significant conditions and transmitting them to the appropriate organization for determination of reportability. The recommended disposition for nonconformances that cannot be reworked to meet specifications is to be 'accept as is' or 'repair' in accordance with the NCR procedure. When the disposition has been determined, the NCR is returned to the CEO for action to implement the disposition. Procedures require that acceptability of rework or repair of materials, parts, components, systems, and structures be verified by reinspecting the item as originally inspected or by a method which is at least equal to the original inspection method; and inspection, rework, and repair procedures are documented.

#### 17.1.15.5 Trend Analysis by Office of Construction (CONST)

A Trend Analysis Program is administered by the Quality Assurance Branch. Reports are prepared from NUC PR, CONST QAB, ASME and ANI audit deficiencies, NRC violations, and significant and reportable conditions adverse to quality. Reports are also prepared from nonsignificant conditions adverse to quality. Copies of trend analysis reports are distributed to appropriate levels of management in PMO, Office of Engineering, CONST, and NUC PR.

#### 17.1.16 Corrective Action

##### 17.1.16.1 Office of Engineering

Corrective action measures for design activities performed by Office of Engineering or by suppliers are required by engineering procedures summarized in Sections 17.1.15.2 and 17.1.15.3.

The Quality Engineering Branch is responsible for following Supplier Nonconformance Reports through to completion including the proper distribution and recording.

The responsible Office of Engineering organization provides for an independent review and approval of the 'actions required to prevent recurrence' on all Office of Engineering significant nonconformances.

#### 17.1.16.2 Office of Construction

Corrective action measures at the site are prescribed in the CONST quality assurance program which provides for the identification and correction of Conditions Adverse to Quality (CAQ) and for the identification of the cause of significant CAQs to permit action leading toward prevention of recurrence.

The corrective action disposition is documented on the NCR and is approved by the appropriate levels of management. The CEO shall take steps to see that the CAQ is corrected in compliance with the approved disposition. The Quality Manager reviews and approves the 'actions to prevent recurrence' on CONST Project significant CAQs.

A file of CONST NCRs is maintained in the records storage facility at each site or in the MEDS online site QA data base. A monthly notification is sent to the Construction Engineer and the Quality Manager of any NCRs that have not been resolved.

#### 17.1.17 Quality Assurance Records

TVA's detailed procedures provide requirements for specific quality assurance records associated with design, procurement and construction to conform to Criterion 1 of the NRC General Design Criteria. The typical types of records to be generated and retained are listed in Appendix A to ANSI N45.2.9-1974.

TVA inspection and test records contain the following entries:

- a. A description of the type of observation.
- b. Evidence of completing and verifying a manufacturing, inspection, or test operation.
- c. The date and results of the inspection or test.
- d. Information related to nonconformances.
- e. Inspector or data recorder identification.
- f. A statement as to the acceptability of the results.

TVA procedures require that records be identifiable and retrievable. The physical quality assurance record turnover to NUC PR is controlled by an Interdivisional Quality Assurance Procedure.

TVA's record storage facilities design criteria contain requirements for constructing, locating, and securing to prevent destruction of records by fire, flooding, theft, and deterioration by environmental conditions such as temperature or humidity.

MEDS in the Office of Engineering maintains the master file for design and construction quality-related documentation and is responsible for ensuring that quality assurance requirements for cataloging, microfilming, storing, dispositioning, and retrieving quality assurance documentation are met.

8

#### 17.1.17.1 Office of Engineering

8

The responsibility for quality assurance records is with the organization that generated the record and in the case of supplier records with the branch which receives the records. QEB is responsible for supplier quality control records on those contracts in which QEB inspection is specified. These responsibilities include ensuring that such records are sent and incorporated into the MEDS systems.

8

7

#### 17.1.17.2 Office of Construction

8

Construction Quality Assurance Procedure, 'Quality Assurance Records,' contains similar provisions for records generated or received at the site during the construction phase.

#### 17.1.17.3 Transfer of Records

The transfer of the Offices of Engineering and Construction quality assurance records to NUC PR is established in an Interdivisional Quality Assurance Procedure. The transfer system makes provisions so that Offices of Engineering and Construction quality assurance records are readily retrievable by NUC PR at all times. MEDS coordinates the transfer of records to NUC PR.

8

8

#### 17.1.18 Audits

The quality assurance audit program consists of internal audits of Office of Engineering, CONST, and PMO, and supplier audits to determine and assess the adequacy and effectiveness of the program. The system of planned and periodic audits is carried out in accordance with written procedures. Procedures require that, as applicable, audits include: evaluation of work areas, activities, processes, and items review of documents and

8

7A

records; review of audit results with management having responsibility in the audited area; and followup on corrective action taken on audit deficiencies.

Each audit organization within the Offices of Engineering and Construction conducts reaudits as necessary to assure that corrective action has been successfully taken. A periodic status report is prepared by the responsible audit organization which gives the status of corrective actions on their respective audits.

| 8 |  
7A  
| 8 |

17.1.18.1 Internal Audits

The scope of an audit is determined by considering such factors as work areas, activities, processes, or items and the specific organizations involved. The scope is approved by the respective quality assurance organization management. Schedules of audits by subject and date are prepared, approved by audit organization management, and issued to affected organizations. In their respective areas, each audit organization within the Offices of Engineering and Construction is responsible for assuring that their audit plans adequately cover applicable elements of the TVA nuclear quality assurance program each year. Audits are regularly scheduled based upon the status and safety importance of the activities being performed and are initiated early enough to assure effective quality is achieved.

| 8 |

Responsibilities for each interface area are assigned to a specific quality assurance branch which has lead responsibilities to plan, schedule, and perform audits and report on that interface.

| 7 |

Copies of audit reports are distributed to cognizant management, including the Director, DQA. Audit reports direct management attention to problem areas and may contain recommendations to eliminate noncompliances and to increase the effectiveness in such areas. Based on these reports, the respective manager takes appropriate actions to correct deficiencies that exist.

| 8 |

| 7 |

DQA performs overview audits of the PMO, Office of Engineering, and CONST to determine and assess the adequacy and effectiveness of their respective quality assurance programs to meet the requirements of Section 17.1 of this topical report. Copies of these audit reports are distributed to cognizant managers. Audit reports direct management attention to problem

| 8 |

areas and may contain recommendations to eliminate noncompliances and to increase effectiveness in such areas. Based on these reports, the respective manager takes appropriate actions to correct deficiencies that exist.

8

17.1.18.2 Supplier Audits

7A

DQA also plans and conducts audits of selected suppliers to verify implementation and adequacy of specified quality assurance requirements. Suppliers to be audited are selected on the basis of importance of their products to safety, status of contract activity, historical performance of the supplier, and potential quality assurance program problems that may be discovered during normal product inspection visits or earlier audits. Audit schedules are prepared and audits are conducted in accordance with the schedule. DQA personnel are supplemented by personnel selected from the TVA line organizations to form specific audit teams based on the type of audit and the complexity of the product.

7

8

7

Audit reports are prepared and approved by the audit team and transmitted to the supplier, the appropriate branch chief and project manager, the Director of Quality Assurance, and PURCH.

7