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QUALITY ASSURANCE PLAN
WESTINGHOUSE NUCLEAR ENERGY SYSTEMS DIVISIONS

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ABSTRACT

This topical report describes the Quality Assurance Plan used by Westinghouse Nuclear Energy Systems Water Reactor Divisions in applying a Quality Assurance Program. The purpose of the program is to assure that the design, materials, and workmanship on Nuclear Steam Supply System (NSSS) equipment meet applicable safety requirements, fulfill the requirements of the contracts with the applicants, and satisfy the applicable codes, standards, and regulatory requirements.

This program addresses the NRC Quality Assurance Criteria, 10CFR50 Appendix B, to the extent that these criteria apply to safety related NSSS equipment. Also, it follows the guidance of the standards and regulatory guides contained within the NRC's "Gray" book, WASH 1283, Rev. 1, May 24, 1974, and "Green" book, WASH 1309, May 10, 1974.

This document replaces the contents of Chapter 17 Safety Analysis Reports, except for any special or unique requirements.

I. INTRODUCTION

This topical report describes the Quality Assurance Plan used in applying a Quality Assurance Program for the Westinghouse Nuclear Energy Systems Water Reactor Divisions. In its present form, the report represents a combination of several years development by Westinghouse and review by the Nuclear Regulatory Commission. The original issue of the program description was in RESAR-3 submitted in June, 1972. This issue addressed the requirements of the SAR Format and Content Guide issued February, 1972. Changes to the program description were made as a result of license reviews on the Catawba and Vogtle projects, the revised SAR Format and **Content Guide (October, 1972), the original issue of the "Gray" and "Green" Books**, issued ANSI Quality Assurance standards, and the generic questions associated with the LaSalle project Quality Assurance review. Most recently, the Nuclear Regulatory Commission issued Revision 1 to the "Gray" Book, WASH-1283, dated May 24, 1974. This document allows Quality Assurance Program descriptions in the form of topical reports. This report contains the documentation necessary to be responsive to that option.

To maintain this topical report current with regulatory requirements, considering the dynamic nature of the Quality Assurance Program, amendments will be submitted twice a year (during the first and third quarters). Proposed changes covering program re-definition and information changes which do not affect the program scope will be presented for NRC approval or for information, respectively, in the interim, as the need for significant change to the quality assurance program occurs. The original issue shows Amendment 6 because this was the current version of Chapter 17 in RESAR-3. For consistency, amendments will be identified with sequential revision numbers, starting with seven (7). Revision 7 of this report was reviewed and approved by NRC on December 31, 1974.

This program description applies to Quality Assurance Programs in effect at this time. Thus, activities accomplished in the current time period

will be performed in accordance with the systems and procedures described herein. Future amendments to this report will be issued to document the program modifications and improvements applicable to the activities performed in the subsequent period. Thus, Westinghouse will incorporate new requirements into the ongoing program in a timely manner, but will not automatically backfit the requirements into previously accomplished activities. It should be recognized that certain new requirements may take a considerable period of time to implement fully. If there are unusual time periods required for implementation, Westinghouse will identify these in the amendment which addresses the new requirements.

The use of the word applicant throughout identifies the plant owner who will seek a construction permit from NRC, and has no relation to the Westinghouse submittal for approval of this topical report.

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17.0 WESTINGHOUSE NUCLEAR ENERGY SYSTEMS DIVISIONS
QUALITY ASSURANCE PLAN

This topical report presents a description of the Westinghouse Nuclear Energy Systems Water Reactor Divisions (WRD) Quality Assurance Plan. Its purpose is to describe the Quality Assurance Program used by Westinghouse WRD to assure that the design, materials and workmanship on Nuclear Steam Supply System (NSSS) equipment meet applicable safety requirements. The Water Reactor Divisions encompass the full scope of NSSS equipment supply for pressurized water reactors covered by this program.

This WRD Quality Assurance Program is a requirement for those NSSS components, systems and structures having a vital role in the prevention or mitigation of the consequences of postulated accidents that could cause undue risk to the health and safety of the public. This program presents our application of the NRC Quality Assurance Criteria, 10CFR50 Appendix B, and follows the guidance of the NRC Gray book, WASH-1283, Revision 1, May 24, 1974, and the Green book WASH-1309, Revision 0, May 10, 1974, and included and referenced regulatory guides and standards to the extent that these apply to the design, procurement, fabrication, manufacturing, and supply of safety related NSSS equipment.

The Westinghouse adherence to regulatory guides listed within these documents recognizes, as clearly stated in the Regulatory Guide Series Preamble, December 12, 1972, that they are not substitutes for regulations. Although these regulatory guides and referenced ANSI standards use the words shall and should to define preferred methods and to indicate acceptable methods, respectively, they are providing guidance towards acceptable, but not exclusive, methods and solutions to quality assurance requirements of contracts, codes, and regulations. This meaning is affirmed in the definition on "Guidelines" provided in ANSI N45.2.10-1973.

Westinghouse understands that while following the guidance of regulatory guides toward meeting regulations, latitude exists for alternatives in practice to properly respond to technical variations and to accommodate variations in local conditions.

This report is structured to provide, first a statement of quality assurance philosophy followed by an overview of the Quality Assurance Program. Sections 17.1.1 through 17.1.18 address each of the NRC Quality Assurance Criteria, 10CFR50 Appendix B. For each criterion the measures employed are described in sufficient detail to allow the reader to understand the Quality Assurance Program.

WRD Quality Assurance Philosophy

Westinghouse Nuclear Energy Systems Water Reactor Divisions are an organizational group of operating divisions whose purpose is to provide nuclear power plant services and equipment. Figure 17-1 depicts the organization. The Pressurized Water Reactor Systems Division (PWR SD) is the lead division within WRD for the overall integration of NSSS equipment design, procurement, and supply. The other Water Reactor divisions, including the Nuclear Fuel Division (NFD), the Nuclear Service Division (NSD), together with the Nuclear Equipment Divisions (NED), (EMD), Tampa Division (TD), and Specialty Metals Division (SMD), provide nuclear power plant equipment and services.

The WRD philosophy on quality assurance is to provide reliable, high quality products. This policy is set forth in a statement by the Executive Vice President of Nuclear Energy Systems and applies to all Water Reactor Divisions for their NSSS equipment scope of effort.

"Each NES Division is responsible to establish, document and implement a Quality Assurance Program which assures that safety-related equipment, materials and services furnished as part of, or in support of a nuclear power plant meet the requirements of 10CFR50, Appendix B. In addition, the applicable requirements of 10CFR50, Appendix B are to be passed to all subtier suppliers of safety-related equipment or services, as an integral part of each division's Quality Assurance Program."

WRD Quality Assurance Program Summary

The WRD Quality Assurance Program is designed and implemented to provide safe and reliable nuclear power plant equipment. The quality organization in each of the Water Reactor Divisions provides the mechanism through which the Quality Assurance Program is administered and monitored. The operation of the program is documented in written procedures and instructions.

The activities of WRD are complex in that there are many disciplines involved. Table 17-1 and Figure 17-2 describe the flow of information and effort required to design and fabricate fuel and Nuclear Steam Supply System equipment. As shown, the process begins with the identification of technical requirements and ends with a description of the monitoring accomplished to assure process adequacy. The flow schedule simplifies many complex activities for the purpose of showing the over-all design and fabrication process. During any of the processes, each WRD participating group has access to higher management for arbitration of unresolved issues which may arise.

Item 7 of Table 17-1 is an example of the flow schedule's treatment of equipment specifications. Equipment specifications are the basic method by which WRD specifies technical requirements for Nuclear Steam Supply System equipment. Before an equipment specification can be prepared, functional engineering information is required from many sources. Specifications are reviewed by many groups. For visibility, the generation of equipment specifications is shown as one entry on the flow schedule. Figure 17-2 depicts a functional rather than formal organizational structure. Like the flow schedule, the functional chart shows the communication network in brief form. On the chart both horizontal and vertical lines show communication flow paths.

The Quality Assurance Program provides for the control of design information. Contractural requirements from the applicant and the contents

of safety analysis reports are inputs to the design process and are reviewed at several points as the design progresses. Essential drawings and equipment specifications are provided to the applicant and his architect engineer for review. Suppliers' submittals of detail designs and procedures are requested where necessary and are reviewed by cognizant WRD personnel to assure compliance with equipment specification and drawing requirements. Design changes which occur during design, fabrication or installation are controlled in a manner similar to the initial design.

In addition to the above, independent design verification activities and environmental performance testing are performed on a selected basis to confirm that equipment will perform satisfactorily. Design control activities are documented. Interfaces between participating design organizations are defined. These interfaces include the supplier-WRD interface, the interfaces among Water Reactor Divisions and the interfaces among sections within the divisions. The WRD philosophy is that an experienced engineer is assigned as the focal point through which all other participating groups work. This concept provides for single point responsibility and accountability. At the same time each participating group has access to higher management for arbitration of unresolved issues.

The WRD Quality Assurance Program provides for the control of purchased material, systems and services. Prospective suppliers are evaluated for quality system capability. Purchase orders are reviewed for quality-related requirements. As applicable, source surveillance and receipt inspection are performed. Supplier documentation essential to demonstrating product quality is reviewed and retained by WRD. Audits and feedback of discrepancy data are used by WRD quality engineers to measure supplier performance.

Each of the Water Reactor Divisions maintain systems to control the review, approval, distribution and revision of instructions, procedures,

specifications and drawings. Because of the varying needs of the divisions, these systems differ in detail. The objective of each of the document control systems is to provide a means for controlling the use of documents so that NSSS equipment is designed and fabricated in accordance with the stated requirements.

WRD manufacturing divisions operate under controlled systems which require the performance of important operations in accordance with instructions and procedures. The means for accomplishing the operation and the criteria for accepting the operation are included in instructions. Typical examples of operations covered include welding, heat treating, nondestructive examination, performance testing, welder qualification, receipt inspection, final inspection, gage control, material handling and material identification. The manufacturing control systems provide for control of the overall manufacturing process. The control system indicates inspection and test status.

The WRD Quality Assurance Program controls nonconforming material by procedures which provide for documented results. All nonconforming material is segregated or, if segregation is physically impractical, clearly identified so that its inadvertent use is prevented. Data from nonconformances are collected and summarized for review and action in making design or operational changes, as appropriate, to minimize recurrence of nonconformances.

The Water Reactor Divisions maintain sufficient records to clearly establish the quality of the product. A microfilmed copy of fabrication and inspection records for NSSS equipment is provided to the applicant as required by contract, for permanent retention prior to plant acceptance. To document equipment acceptability prior to site installation a copy of the purchase order, the applicable design specification and the quality release are provided to the applicant.

A comprehensive audit program is part of the WRD Quality Assurance Program. This audit program provides WRD management with information pertaining to the effectiveness of the overall quality program. Planned and scheduled audits are conducted with results reported to appropriate management levels and corrective action taken as necessary.

The applicant's need to be assured of the adequacy of the WRD Quality Assurance Program is recognized by WRD management. The WRD Quality Assurance Program provides an extensive amount of design information for applicant information and use. On a typical nuclear power plant, in the order of 1000 equipment specifications, drawings and various design installation, testing and quality assurance manuals are transmitted for information and use. Audits by the applicant are performed on WRD activities covering design, manufacturing and documentation. The applicant may also participate with WRD quality assurance personnel in selectively performing supplier surveillance, and supplier audits. Quality-related procedures and instructions as well as the results of tests and inspections are available to the applicant for his review to verify the operational adequacy of the overall quality program.

Policy

It is the Westinghouse Corporate Quality Policy "to supply products that satisfy the quality requirements of its customers. When the quality requirements are included in drawings, specifications, and contracts, it is policy to comply and deliver to the customer a product that conforms to these requirements. When the quality requirements are not formally specified, reasonable requirements should be inferred."

"It is Westinghouse policy to supply products with a quality equal to, or better than the quality, of competitive products...."

"Each division should establish and publish a quality policy consistent with the corporate policy describing the specific policy applicable to its products and markets." (Extracted from Corporate Quality Program Manual dated 1973.)

Since WRD consists of several divisions within Nuclear Energy Systems (NES) that work jointly to provide commercial Nuclear Steam Supply Systems to the utility industry, it is necessary for these divisions to define and implement a common policy pertaining to Quality Assurance. Mr. J. C. Rengel, Executive Vice President of NES divisions, has established the common policy and directed each of the NES Divisions to comply. This commitment and policy applies both to the WRD scope of effort for commercial pressurized water reactor NSSS equipment and to related Advanced Nuclear Systems Divisions engaged in design and implementation of the Fast Flux Reactor Program. The following is quoted from Mr. Rengel's letter of October 29, 1973 to all NES Division General Managers, re-affirming the Policy established in 1969.

"The commitment of Westinghouse Nuclear Energy Systems to effective and uniform implementation of Appendix B to 10CFR50, 'Quality Assurance Criteria for Nuclear Power Plants' is re-affirmed.

"Each NES Division is responsible to establish, document and implement a Quality Assurance Program which assures that safety-related equipment, materials and services furnished as part of, or in support of a Nuclear Power Plant meet the requirements of that Appendix. In addition, the applicable requirements of 10CFR50, Appendix B are to be passed to all subtier suppliers of safety-related equipment or services, as an integral part of each division's Quality Assurance Program.

"Toward this end, annual Quality Assurance system audits will be conducted of each NES division by audit teams composed of members

of the NES QA Committee. This Committee is composed of the Quality Assurance and/or Product Assurance managers of each of the NES Divisions and is chaired by the PWRSD Product Assurance Manager.

"This audit program complements the Corporate Headquarters Manufacturing Controls audits since it will take advantage of the special nuclear capabilities of the participating divisions and it will also take into account problems peculiar to the nuclear industry. The Corporate Headquarters audit, held on the average of once each three years, will substitute for the annual NES audit in the year it is held. In addition to carrying out audits, the Committee will continue to serve as a forum to communicate quality and reliability programs and to establish improved and consistent policies on Quality Assurance. The lead responsibility is placed with PWR Systems Division for the functioning of the Committee, for providing assistance on related matters to all Nuclear Energy Systems Divisions and in interpreting, developing and promulgating consistent methods for incorporation and application of Appendix B requirements.

"Annual NES audits will not take the place of the more frequent audits required to meet our responsibilities to utility customers. Process audits by PWRSD of EMD, Tampa and Pensacola, and by Tampa and NFD of Speciality Metals, will form an integral part of our overall program to provide independent evaluation of the design, manufacturing, inspection and test controls applied to the products involved."

This report provides an overview of how this basic policy is implemented in the various Water Reactor Divisions of Nuclear Energy Systems.

17.1 QUALITY ASSURANCE DURING DESIGN PROCUREMENT AND CONSTRUCTION

17.1.1 ORGANIZATION

WRD is comprised of a number of operating divisions within NES as shown in Figure 17-1. The authority and responsibility of each activity shown on this chart and the charts of each Water Reactor Division was established by the Executive Vice President of NES and is promulgated by the Vice President and General Manager of the Water Reactor Divisions. Statements of activity scope and function are issued for each division. The division managers within WRD have ultimate responsibility for the quality assurance program of their respective divisions, and the establishment of an organizational structure capable of development, implementation and monitoring of the total quality assurance program. The solid lines on the divisional organization charts (Figures 17-3 through 17-8) delineate both technical direction and administrative control. Administrative control includes responsibility for personnel indoctrination and training, wage and salary administration, and the decision for hiring or discharge of personnel.

Written position descriptions are prepared for each management position and professional classification and are approved by two levels of management. These descriptions specify the educational and experience qualifications of the position, and define the task responsibilities for the position.

The quality assurance aspects of WRD activities are overseen and coordinated by the NES Quality Assurance Committee. The Committee has been established by the NES Executive Vice President as an extension of the policy to apply an effective quality assurance program, as expressed in the preceding pages.

Members of the Committee are appointed by the NES Executive Vice President as those holding positions of quality assurance managers in the NES divisions and the Executive Assistant to the NES Executive Vice President. The Committee has authority to identify problems, recommend solutions, verify implementation of authorized actions and verify effective implementation of actions and policies through the Committee auditing function.

The Committee performs annual audits of each WRD division to provide information to WRD management for assessing if requirements relating to quality assurance are being met effectively.

The Committee also acts as an advisory body to the WRD Vice President and General Manager and for making recommendations regarding improvement and verification of the division's quality assurance systems. Decisions on policy are made by the Vice President and General Manager, and the Committee serves as one of the means for putting the determined policy into effect. In addition, the Committee provides a channel for communications between quality assurance personnel of the WRD divisions, serving to integrate the quality assurance actions, to alert all divisions to quality problems and solutions, and to promote effective teamwork.

The lead responsibility for the functioning of the Committee is placed with PWR Systems Division. The PWRSD Product Assurance Manager serves as Chairman for the Committee, and PWR Systems Division takes the lead in definition and documentation of the WRD quality assurance program.

Quality Management within each of the Water Reactor Divisions does not have prime responsibility for schedule or cost, but does have the authority to stop work pending resolution of quality matters and the freedom to:

1. Identify quality problems.
2. Initiate, recommend, or provide solutions through designated channels.

3. Verify implementation of solutions.
4. Control further processing, delivery or installation of a nonconforming item, deficiency or unsatisfactory condition until proper dispositioning has occurred.

Overall contract responsibility for supplying the Nuclear Steam Supply System (NSSS) is assigned to a project manager within PWR Systems Division (PWR SD). He provides the focal point for communications among the Water Reactor Divisions, the applicant and the architect engineer. The Quality Management of PWR SD maintains communications on quality-related matters with utility and major utility contractor quality assurance organizations, and provides advice of such discussions to project managers.

The following is a summary of design, manufacturing and quality assurance responsibilities of the Water Reactor Divisions involved in furnishing NSSS equipment and services. Each division maintains and uses a Quality Assurance Manual which details the local application of that function.

17.1.1.1 PWR Systems Division

PWR Systems Division, as shown on Figure 17-3, is the lead Water Reactor Division with regard to the project management, systems design, integration of NSSS equipment design and procurement of NSSS equipment.

The Project Department of PWR Systems Division, through a designated Project Manager, has the primary responsibility within WRD for coordination of supply of the NSSS equipment and services to the applicant.

The Purchases and Traffic Department provides the PWRSD procurement interface with suppliers and with other WRD Divisions, except for NFD. This department also administers the transportation of equipment from supplier's facilities and other Water Reactor Divisions to the construction site.

Technical assistance for unloading, handling and storage is furnished to the applicant through the Field Operations and Technical Operations Departments of the Nuclear Service Division.

The Engineering Department of PWRSD consists of several sections. These sections are responsible for performing the various technical functions associated with system design and design of NSSS equipment.

The Nuclear Safety Department is responsible for providing the Nuclear Steam Supply System safety system performance requirements, safety system criteria, safety analysis methods, and safety evaluations to provide the required analytical and statistical evaluation of postulated accident controls. Further, the department is charged with providing the licensing activity to support the applicant in obtaining the construction permit and operating license for the Nuclear Steam Supply System.

Within PWRSD, responsibility for Quality Assurance activities is assigned to the Product Assurance department. This includes having lead responsibility for developing, documenting, and executing the

Quality Assurance program; and demonstrating compliance with the 18 Criteria of 10CFR50 Appendix B. The manager of Product Assurance reports directly to the division general manager and is in parallel with the other major departments within the division, as shown in Figure 17-3. Thus, matters pertaining to product and system quality can be related directly from the Product Assurance Manager to the division general Manager, independent of other functional activities. The qualification requirements for the Product Assurance Manager are:

1. a bachelor's degree in a technical field;
2. at least ten years experience in engineering or manufacturing;
3. at least five years experience in management of technical or manufacturing organizations;
4. working knowledge of applicable quality-related codes, standards, regulatory and statutory requirements; and
5. demonstrated ability to prescribe, apply and assess compliance with applicable requirements.

Training relevant to quality assurance activities and pertinent to the position is described in Section 17.1.2.

The Product Assurance Manager directs, controls and evaluates the PWRSD Quality Assurance Program. This is accomplished through the development, coordination and publication of divisional policies and procedures, conduct of instruction and training programs on quality matters, and investigation and assessment of the program effectiveness through the internal auditing program. Personnel from the Product

Assurance Department work with representatives from the other functional departments (Engineering, Purchasing, Nuclear Safety, Projects) to assure that activities affecting quality are properly defined, implemented and controlled.

Discussion and resolution of quality matters with the applicant and/or his agent is coordinated with the cognizant project manager. Product Assurance personnel provide information in response to customer inquiries and audits of PWRSD Quality Assurance activities.

The Product Assurance Department, as described by the department charter, has been assigned responsibility and authority to identify quality problems in quality-related functions of design, procurement, manufacturing and testing; take prompt positive action to limit incipient problems; initiate, recommend or provide solutions to the problems to responsible management; verify implementation of the necessary corrective action; and take action to obtain and record proper disposition of unsatisfactory conditions prior to release of NSSS equipment.

The Product Assurance Department is divided into two groups, Product Assurance Systems and Quality Assurance. The efforts of each group are directed by individual managers.

The Product Assurance Systems group has six major functional responsibilities. These are: 1) The investigation and analyses of the Division's procedures for compliance with the criteria of 10CFR50, Appendix B as well as other industry and corporate quality standards, 2) preparation, promulgation and maintenance of division-level policies and procedures, 3) administration of centralized files and quality records, which includes compilation, auditing, storage and retrieval of NSSS equipment quality assurance records, 4) internal auditing for

compliance to established procedures, 5) quality engineering and 6) reliability engineering. Responsibilities are assigned to organizational groups as defined below.

Quality and Reliability Engineering is responsible for the planning aspects of the systems applied to NSSS equipment quality assurance, for providing input to equipment specifications, drawings, and related procurement documents, and collaborating in the evaluation of supplier quality assurance programs with Quality Assurance. Quality and Reliability Engineering is also responsible for reliability analysis of NSSS equipment and the development of supporting reliability information. These activities of Quality and Reliability Engineering encompass both mechanical and electrical equipment.

Systems Compliance is responsible for PWRSD internal audits, for coordination of customer audits and for the preparation and maintenance of policies and procedures for PWRSD.

Records Management establishes filing and retrieval systems, prepares and maintains records flow schedules, prepares quality assurance forms, provides for supplier data collection and auditing, and develops methods for data package handling, including microfilming techniques.

Files Operations maintains and operates central files to handle and store the engineering and quality assurance records within PWRSD. This group is also responsible for coordination of storage and retrieval activities with the Corporate Records Center.

The Quality Assurance Section consists of four groups: Quality Assurance Surveillance Zones 1, 2, 3, and Quality Assurance Surveillance Electrical. Quality Assurance Surveillance Zones 1, 2 and 3 provide product, process and systems coverage of suppliers of mechanical equipment, as further

defined in sections 17.1.7.1, 17.1.9.1, 17.1.10.1 and 17.1.11.1. Quality Assurance Surveillance Electrical provides the same functions for electrical equipment, properly emphasizing those surveillance activities pertinent to electrical equipment.

The Quality Assurance Surveillance groups monitor the activities of PWRSD suppliers, verify conformance to procurement quality requirements, audit the supplier's quality systems, and release equipment for shipment. These groups also perform audits of Water Reactor manufacturing divisions to verify the adequacy of quality assurance systems which are being applied in execution of the design and manufacturing responsibilities assigned to these divisions. Surveillance personnel are trained and qualified to review supplier tests and inspections, and are qualified to SNT-TC-1A requirements in the review, or performance, of nondestructive examinations.

Both resident and itinerant QA representatives are employed. To provide the most effective coverage of suppliers, managers are assigned responsibility for performing mechanical equipment surveillance in specified geographic areas encompassing both domestic and international suppliers. The QAS Electrical section performs the surveillance function for procurement of electrical equipment. Responsibility for overseas supplier evaluation and surveillance is normally delegated to other Westinghouse WRD organizations, such as WNE (Europe), however, such delegation is coordinated by PWRSD Product Assurance.

17.1.1.2 Nuclear Fuel Division

The Nuclear Fuel Division (NFD) has responsibility for the design and manufacture of nuclear fuel assemblies and associated reactor core components such as control rods, burnable poison assemblies, source assemblies and plugging devices. This division is also responsible for

specifying and procuring appropriate shipping containers. The organization of this division and a description of the Nuclear Fuel Division Quality Assurance Program is contained in Reference [1].

17.1.1.3 Electro-Mechanical Division

Electro-Mechanical Division designs, manufactures and tests control rod drive mechanisms, reactor coolant pumps, loop stop, gate and check valves. Figure 17-4 shows the organization for the Electro-Mechanical Division.

This division is a qualified manufacturer per requirements of ASME Boiler and Pressure Vessel Code for Nuclear Power Plant Components Section III and holds Certificates of Authorization for the use of the "N" and "NPT" symbol stamps.

The Engineering section develops the detailed design drawings and specifications, including those for procurement, from contractual equipment specifications provided by PWRSD. Formal design reviews precede the finalization and issuance of all new product designs.

The Design and Analysis groups perform detailed design and design analyses, such as stress and seismic analyses.

The Planning and Materials section maintains advanced schedules, and plans to advance procurement of materials. Purchasing maintains liaison with materials and parts suppliers, and performs the procurement function.

Manufacturing is responsible for the generation and control of manufacturing information, and for production control; the Manufacturing Groups are responsible for fabrication of product.

The Quality Assurance Organization has prime responsibility for assuring compliance to all contractual requirements. In addition, each department is responsible for applicable controls as outlined in the Quality Program Manual.

The overall responsibility for the implementation of the Quality Assurance Program is vested in the Quality Assurance Manager who also has the authority to enforce full compliance with all quality requirements relative to safety, reliability, operation and maintenance. This authority extends into the area of "stop work". The quality assurance manager reports to the division general manager. Qualification requirements for this position are:

1. a B. S. degree in engineering or equivalent;
2. eight years experience in a technical field with a minimum of 5 years in a supervisory capacity; and
3. must possess skills in directing the establishment, administration, and control of divisional quality assurance programs which meet both regulatory and industrial requirements.

Training relevant to quality assurance activities and pertinent to the position is described in Section 17.1.2.

Quality Assurance Engineering is responsible for planning controls to assure product quality. This includes: review of all contractual/governing specifications, engineering design drawings and specifications, purchasing information and detailed manufacturing instructions. This organization is responsible for the design and implementation of Inspection Point Programs including non-destructive examination incorporated into manufacturing work instructions, qualification of

non-destructive examination personnel, and audits. Quality Control Records of Quality Assurance Engineering compiles documentation maintained as objective evidence of inspections performed, and Material Review section of Quality Assurance Engineering performs analyses of data, review of manufacturing discrepancies, and initiates preventive actions to eliminate problem areas.

The Inspection Section of Quality Assurance is responsible for performing inspections and examinations listed in manufacturing work instructions as prescribed by Quality Assurance Engineering procedures and instructions, recording results, and determining product acceptability to specified criteria.

Supplier Field Assurance Engineering is responsible for surveys and qualification of suppliers, design and control of quality programs for purchased material, in-process inspections and tests, audits, final inspection and release of supplied product.

Design/test engineers of the Works Engineering and Test Operation section are responsible for test specifications, hydrostatic and performance tests, evaluation of test results and issuance of the test release.

Quality Assurance Engineering is responsible for the final release and certification of all product prior to shipment.

17.1.1.4 Tampa Division

Tampa Division designs and manufactures steam generators and pressurizers. Figure 17-5 shows the organization for the Tampa Division.

Tampa Engineering and Design and Analysis Groups perform the detail design from equipment specifications provided by PWR Systems Division.

The manufacturing groups are responsible for the fabrication and testing.

The Purchases and Traffic and Purchases Procurement groups control procurement and shipment of materials, supplies and components.

The Reliability Manager directs the activities of Reliability Engineering, Quality Assurance, QA/NDE and International Quality Assurance. The qualification requirements for the position of Reliability Manager are:

- 1) a bachelor's degree in a technical field;
- 2) at least eight years experience in engineering or manufacturing;
- 3) at least two years experience in management of technical or manufacturing organizations;
- 4) working knowledge of applicable quality-related codes, standards, regulatory and statutory requirements; and
- 5) demonstrated ability to prescribe apply and assess compliance with applicable requirements.

Training relevant to quality assurance activities and pertinent to the position is described in Section 17.1.2.

Overall responsibility for the implementation of the Quality Assurance Program is vested in the Quality Managers, who have the authority and responsibility to stop any operation to assure compliance with the ASME Code, customer requirements and the Westinghouse requirements.

Quality Assurance activities include review of design drawings, welding specifications, and manufacturing instructions. Quality Assurance performs source inspection on pressure boundary material, plates, forgings, castings and tubes, and has responsibility for inspection of incoming items not inspected at source.

Responsibility for planning controls to assure product quality resides with Quality Assurance engineering. Quality Assurance planning includes preparation of Inspection Point Programs to assure compliance with drawings, specifications and ASME Code requirements; the Inspection Point Program provides process and product verification and is also utilized as a permanent record of the inspection operations. The details of the inspection program follow the manufacturing sequence of the operational line-up, the format delineates the applicable forms, charts, reports and documentation required.

The Inspection Point Program is implemented by technicians in the Quality Control section of the Reliability Department.

The Quality Assurance Department is responsible for planning and implementation of non-destructive examination and for qualification of non-destructive examination personnel, and for monitoring performance of tests.

The responsibility for conducting internal audits resides with the Manager of Quality Assurance. The audit program provides management with a continuing overview of the compliance with the quality program.

Reliability Engineering coordinates the Tampa efforts to resolve field discrepancies and initiate the required corrective action. Reliability engineers participate in the design review function and provide additional engineering support in the area of failure modes and effects analyses.

17.1.1.5 Pensacola Division

Pensacola Division is responsible for the design and manufacture of reactor internals and associated equipment. The organization is shown in Figure 17-6.

The Pensacola Quality Assurance organization provides measures to control the design, manufacture, purchase, inspection, test, packaging, shipment and site installation of reactor internals. Quality Assurance functions for control of purchased materials include source surveillance and audits of suppliers which are performed by Quality Assurance Engineering. This section is also responsible for reviewing drawings and design specifications and for coordinating the internal audit program for the Pensacola Division, by a Quality Assurance Engineering Audit Coordinator.

The Inspection section of Quality Assurance performs inspections and examinations defined by Quality Assurance Engineering instructions and procedures, records results, and determines product acceptability to prescribed acceptance criteria and standards. Records section of Inspection performs release of product.

The Site Quality Assurance Services section of Quality Assurance provides support for installation of reactor internals at construction sites.

The Quality Assurance Manager reports directly to the Pensacola Division Manager. Thus, the Quality Assurance Department functions independently to identify quality problems, and to initiate, recommend and provide appropriate solutions. Quality Assurance is vested with the authority and responsibility to stop production until acceptable solutions have been provided. The qualification requirements for the position of quality assurance manager are:

1. a B. S. Degree or equivalent in experience with knowledge of metal working, process control and nondestructive examination disciplines;
2. minimum of five years supervisory experience, with a minimum of five years experience in the quality assurance/quality control field; and
3. working knowledge of quality assurance techniques, applicable quality-related regulations and codes, such as ASME code.

Training relevant to quality assurance activities and pertinent to the position is described in Section 17.1.2

17.1.1.6 Specialty Metals Division

Specialty Metals Division manufactures tubing used by Tampa Division and Nuclear Fuel Division in accordance with specifications provided by Tampa and NFD. Figure 17-7 shows the SMD organization. The Manager of Quality Control and Inspection has the authority to stop work on product which, if continued, would not meet customer specifications. Position requirements for Manager of Quality Control and Inspection are:

1. B. S. degree in Metallurgical or Chemical Engineering;

2. specialized technical skills in tube mill technology;
3. minimum of 3 years supervisory experience;
4. minimum of 4 years quality control, process, or industrial engineering experience;
5. minimum of 3 years tube mill quality control or production experience; and
6. ability to design and administer a quality system which satisfies the requirements of Appendix B to 10 CFR 50.

Training relevant to quality assurance activities and pertinent to the position is described in Section 17. 1.2.

Quality Control and Inspection has direct control of the division gage calibration system, non-destructive examination, internal auditing, and quality engineering functions. Review of raw material acceptability is also a function of this group, performed by audit, receiving inspection and analysis of incoming material reports, including review of a sample of chemistry re-analyses made by Quality Services. These combined actions are effective in obtaining specification quality raw materials, and source surveillance is not applied. Quality Control and Inspection has the responsibility for the training and qualification of inspectors, for in-process inspection, and for final inspection. Quality Services has responsibility for product verification and certification. Instrument service is performed by the Maintenance Department according to a schedule specified by Quality Control and Inspection.

17.1.1.7 Nuclear Service Division

The Nuclear Service Division's major responsibilities during the design and construction phases of the nuclear power plant are to provide services such as, construction consultation, component handling and preoperational services including startup assistance, baseline inservice inspection, warranty repairs and modifications. Figure 17-8 shows the NSD organization.

The Operating Plant Technology section of the Technical Operations Department has design, development and requisitioning responsibilities for tooling and equipment utilized in preoperational services such as baseline inservice inspection.

The Component Handling Services section of the Field Operations Department has the responsibility for the design, requisition, maintenance and supplying of component handling equipment for major Westinghouse supplied equipment.

NSD representatives under the direction of a site manager reporting to Field Operations provide consultation for the work performed by the construction contractor and subcontractors on NSSS equipment. Qualified personnel provide technical advice and coordinate the application of guidance documents on various disciplines of construction such as welding, mechanical and electrical systems, instrumentation and control equipment, pre-operations and startup testing. The site personnel provide guidance and assist the applicant to verify that the Westinghouse NSSS equipment is in good condition when received and that it is stored, handled and installed properly according to applicable specifications, procedures and manufacturer's instruction. Special processes such as welding, cleaning and nondestructive examination are observed by

qualified Westinghouse personnel to provide guidance in assuring that the work is performed in accordance with WRD requirements. Additionally, NSD personnel administer the site related activities of the Field Deficiency Reporting System including identifying, reporting and disposition followup for nonconforming material or equipment discovered at the site.

The Startup Service section of Field Operations is responsible for furnishing procedures, Westinghouse owned equipment and personnel to assist the applicant in developing and executing the pre-operational and startup test programs for Westinghouse NSSS.

The Product Assurance Department is responsible for the QA program for the above mentioned activities. The NSD QA Program Plan describes the overall QA program. The Product Assurance Manual, the Division Operating Procedures Manual, the Field Operations Manual and the Technical Operations Manual contain implementing procedures. The procedures in these manuals are written or approved by Product Assurance to assure compliance with the QA Program Plan.

The Quality Assurance program is directed by the Product Assurance manager who reports directly to the division general manager. The Product Assurance manager has the organizational freedom and authority to plan and coordinate the quality program, to identify quality problems, initiate solutions, and to verify execution of solutions. He has the authority to enforce compliance with the QA program requirements, including the authority to disapprove drawings, specifications or other documents where quality requirements are not met. He also has the authority to stop work or to control further operations where significant conditions adverse to quality are identified and immediate corrective actions are required.

The qualifications for the NSD Product Assurance Manager position are:

1. a B.S. degree in a technical field
2. at least 10 years experience in engineering, quality assurance, or manufacturing;
3. at least 5 years in management;
4. knowledge of applicable quality-related codes, standards and regulatory requirements; and
5. demonstrated ability to assess and enforce compliance with applicable requirements.

The Product Assurance Department consists of two groups, Quality Assurance and Product Assurance Systems.

Quality Assurance is responsible for Quality Engineering and surveillance of suppliers and field activities.

Product Assurance Systems is responsible for QA systems, procedures, coordination or internal audits, QA records and training.

17.1.1.8 Functional Responsibility

The functional responsibilities of designing and fabricating fuel and NSSS equipment and the integrated quality assurance responsibilities for both safety and non-safety equipment are shown in Table 3.2-1, Chapter 3 (which is contained in the Safety Analysis Report). The identification of safety-related equipment is also covered in this table.

17.1.2 QUALITY ASSURANCE PROGRAM

The WRD policy is to provide nuclear power equipment and services that will provide an electric utility with a safe and reliable plant throughout its design life. The WRD Vice President and General Manager establishes and communicates policies pertaining to quality assurance matters to each of the Water Reactor Divisions for implementation. Each division manager further applies the WRD policy as necessary for local application. The quality assurance management in each Water Reactor Division is responsible for defining the quality assurance program content and maintaining the program consistent with these policies. The quality assurance program for each Water Reactor division is authorized, reviewed and approved by the division general manager. Definition of the policy and program is reflected in division operating procedures, with definition of the specific quality assurance procedures incorporated in a quality assurance manual. The manual is prepared by the cognizant quality assurance personnel and approved by the responsible QA management of the respective division.

The NES Quality Assurance Committee is responsible for review and proper integration of the quality assurance programs of each Water Reactor Division. Through the activities of the NES QA Committee and the various auditing processes, including the Corporate Head-quarters audits, described in Section 17.1.18, regular and independent management assessment of the scope, implementation and effectiveness of the individual quality assurance programs is made in accordance with the requirements of 10CFR50 Appendix B, and this plan. In addition to these actions, the NES QA Committee assesses the integration of the QA programs among the interfacing divisions.

This topical report contains a description of the WRD Quality Assurance Program and is supported by written policies and procedures governing quality-related functions and activities from initiation of design through fabrication and shipment. Identification of the principal quality assurance documents is made throughout this topical report.

Both safety and non-safety related structures, systems and components controlled by the quality assurance program and the respective organizations applying quality assurance related functions on these items during design engineering, fabrication, testing and inspection are shown in Table 3.2-1 of the applicable SAR document. Identification of safety-related equipment is also contained in this table.

Table 17-2 gives a typical and representative listing of the written procedures within WRD for implementing the Quality Assurance Program. Listed are the various manuals and the subjects covered, giving a short description of their purpose, and relating each topic to the applicable criterion of 10CFR50 Appendix B.

To assure that those management and supporting personnel performing quality related activities are knowledgeable of quality procedures and program requirements and are proficient in implementing them, a training program exists consisting of:

1. Annual Corporate training and development program - The Corporation provides broad training programs for personal development of managerial and professional personnel. Local WRD management determines each year where such development is needed and selects attendees for the Corporate courses. These courses provide between 8 to 40 hours of instruction; examples of courses attended by management and professional personnel are; "Problem Solving and Decision Making," "Management by Objectives,"

"Configuration Management," "Design of Experiments," "Statistical Practice in the Control of Quality," "New Manufacturing Concepts," "Elements of Quality Control Engineering" and "Material Handling and Storage."

2. Periodic seminars for quality assurance personnel regarding NSSS equipment - These seminars include discussion on the application of quality related policies, manuals and procedures. These seminars involve those technical professional personnel who perform activities affecting quality. The range of topics includes: detailed review of equipment design, fabrication and testing; auditing techniques; supplier surveillance techniques; application of design control methods; and reviews of newly issued specifications and standards. These seminars are supplemented by personnel participation in the activities and training provided by professional societies such as ASNT, ASME, ASQC. Seminars typically provide one to three hours of instruction. Where surveillance activity is extensive, special seminars extending 4 to 12 hours are provided for surveillance personnel indoctrination and training.
3. Discussions on specific quality topics regarding techniques applicable to quality assurance of NSSS equipment - These are chaired by a QA manager for the purpose of discussing a quality problem or as a preventive measure to preclude occurrence of a problem. These discussions include management and technical professional personnel. The range of topics, as examples, includes: methods of supplier evaluation; identification of materials & equipment; application of controls for new regulations and requirements; techniques for use in assessing equipment preparation for release and shipment. These discussions typically provide two to four hours of moderated discussion coupled with instruction.

4. Classroom courses for nondestructive examination training - Personnel who perform the examinations or who monitor the performance of examinations are qualified, as applicable. These courses are typically 3 to 5 days duration, including instruction, practice and examination.

In addition to the foregoing programs, each of the Water Reactor Divisions provides instruction to personnel responsible for performing quality related activities on the purpose, scope and implementation of quality related manuals, instructions and procedures. Each of the Water Reactor Divisions also provides training in the principles and techniques of quality-related activities and determines that personnel performing, or monitoring, quality-related activities are qualified, relative to pertinent responsibilities associated with each function or activity. These training periods typically are one to three hours duration of formal instruction and/or on-the-job demonstration.

The Quality Assurance Program requires that contractors and suppliers of NSSS equipment have quality systems consistent with the requirements of the Quality Assurance Criteria, and includes provisions for review and approval of contractors and suppliers quality assurance programs.

17.1.2.1 Qualification of Inspection, Testing and Examination Personnel

Westinghouse policies and procedures for qualification of personnel engaged in inspection, examination and testing activities follow the guidance of ANSI N45.2.6-1973, Qualification of Inspection, Examination and Testing Personnel for the Construction Phase of Nuclear Power Plants, as endorsed by Regulatory Guide 1.58. Westinghouse uses demonstrated

capability of performing the assigned tasks to predetermined standards or levels of proficiency as the primary basis for evaluating the qualifications and certifying the personnel as an acceptable alternative to the specific years of education/experience.

Westinghouse applies the guidance of this standard to personnel who perform inspection, examination and testing activities including surveillance of these activities for safety-related equipment, materials and services in the Water Reactor Divisions and at outside suppliers.

These organizations are required to establish written procedures for the qualification and certification of personnel who perform or provide surveillance of inspection, examination and testing activities. These procedures include the qualification requirements appropriate for the activities performed, and provisions for: maintenance of training and physical examination commensurate with the activity assignment. Each record or certificate of qualification includes in definitive terms, the activities the individual is qualified to perform and the basis used for certification. Personnel are qualified for the tasks they are assigned to perform. Westinghouse evaluates the adequacy of the personnel qualification programs through its audit and/or surveillance activities.

17.1.3 DESIGN CONTROL

Each of the Water Reactor Divisions involved in NSSS design provides measures to assure effective design control. Westinghouse policies and procedures for design control follow the guidance of ANSI N45.2.11 -1975, Quality Assurance Requirements for the Design of Nuclear Power Plants, for safety-related equipment. The design control methods Westinghouse uses, as applied to each tier of supply, are summarized in

Tables 17-1, 17-2, and described throughout this section. These methods include such activities as: specifying quality standards, determination that equipment characteristics are inspectable, selection and review of design methods, design change control, design interface actions, and implementation of design procedures.

Where computer programs are used in design analysis, these programs are verified and their usage is controlled.

17.1.3.1 PWR Systems Division

The project manager is responsible for identifying to engineering, purchasing, licensing and quality assurance groups the specific requirements applicable to each nuclear power plant. This identification process is the start of the design activity on a nuclear power plant. Changes to distributed information are also issued by the project manager.

Nuclear Safety prepares safety analysis reports. Prior to the submittal of NSSS portions of safety analysis reports to the applicant Nuclear Safety engineers obtain engineering review and concurrence of technical content. Also, quality assurance review and concurrence is obtained for the quality assurance section of safety analysis reports. The review process is formal and documented.

Based upon the identified technical parameters, systems engineering groups review the design of NSSS equipment to determine that functional, safety and regulatory requirements are met. Mechanical and electrical design engineers participate in the functional design process by identifying equipment limitations and resolving functional requirements with equipment capabilities.

Mechanical equipment engineers are responsible for designing or specifying NSSS equipment. Nuclear Safety Department engineers specify safety parameters and provide them to engineering groups for incorporation into components and systems specifications. Equipment specifications are prepared by the electrical and mechanical design engineers. The term "Equipment Specification" as used in this plan includes drawings when they are used instead of equipment specifications. Detailed quality control requirements are specified in the equipment specification, its references, or in the procurement document. Examples of these are non-destructive examinations, acceptance criteria, functional tests, and recording of the measured values of key characteristics. In the few cases when equipment specifications or design drawings are not used, the specific quality control requirements, tests and acceptance criteria are identified in the purchase order. The design of equipment also provides for access to components for inservice inspection and maintenance as required to assure continued integrity throughout the life of the plant.

Equipment specifications and changes to equipment specifications are reviewed to verify that they correctly incorporate design bases and meet system requirements, conform to established engineering standards, meet code requirements, satisfy safety requirements including those specified in safety analysis reports and contain necessary quality requirements. The design interfaces are a function of the type of component being designed. The equipment specification author/shop order holder, based on detailed knowledge of the specification content and the content source, is responsible for the selection of reviewers. Written procedures exist for aiding in this selection. Further, the cognizant manager, by independent determination, verifies the adequacy of the list of reviewers. Reviews are conducted by design and input interface groups as required, in their area of cognizance. All

equipment specifications and subsequent changes are reviewed by Quality Assurance. Written engineering instructions prescribe preparation, review, approval and methods for changes to equipment specifications. These instructions assure that the reviews properly accomplish the design verification function.

The design verification method is selected for proper accomplishment, and may involve such methods as design review, alternate calculations, or qualification testing. Where a test program is used in lieu of other verifying or checking processes, a qualification test of a prototype unit under conditions designed to simulate the most adverse design conditions is used. At times test programs are used in conjunction with other means of design analysis. In these cases, analysis is used to verify selected portions of the operating performance regions, and the test program is used to verify design at the remaining intervals of operating conditions. The design verification is performed by individuals or groups other than those who performed the original design. In exceptional cases, when the designer's supervisor maintains a detailed expertise on the design, the supervisor will perform the design verification function, and document the reason for this action. Design alterations initiated as a result of design review, discovery of design deficiency or design error, are formally documented as design changes.

Written procedures control design changes, including field changes. These procedures require review by those design input groups whose area of cognizance is affected by the change. Review and approval commensurate with the measures applied to the original design, is accomplished in accordance with written engineering instructions. Upon approval, engineering initiates the required action to change the drawings and specifications to accurately reflect the design change. When approved for release, copies of the revised documents are provided

to the applicant as well as other organizations needing the documents for subsequent work. As discussed in Section 17.1.6, this distribution system is controlled.

Aspects of the equipment design that have an effect on that part of the plant design performed by the applicant are forwarded to them for their review. Applicant or architect engineer drawings which have an effect on the WRD scope of supply are likewise sent to WRD engineers for their review.

The implementation of the design control system is audited by Product Assurance Systems.

Where contractors or suppliers are responsible to design to meet Westinghouse specified requirements, the purchase order contains requirements for a documented design control system.

Design documents, design records, related records and changes thereto are collected, stored, and maintained in a systematic and controlled manner.

17.1.3.2 Electro-Mechanical Division

Upon receipt of an equipment specification from the PWR Systems Division, the design engineer is responsible for translation of equipment requirements for reactor coolant pumps, control rod drive mechanisms and valves into specifications, drawings, procedures, and instructions.

Engineering Department instructions specify that all designs be reviewed by a Design Review Committee, chaired by an individual who is not a direct supervisor of the lead design engineer or directly involved

with the original group. Technical reviews by engineering personnel verify design adequacy for compliance with performance requirements. Divisional design reviews with participants from Engineering, Manufacturing and Quality Assurance, as a minimum, coordinate all departments to assure compatibility with code and quality requirements. In addition to the formal review process described above, drawings and equipment specifications are reviewed by cognizant groups within the Division, including Quality Assurance Engineering. Manufacturing routings, which incorporate references to governing drawings and specifications, are reviewed to verify acceptability and signed by Quality Assurance Engineering prior to release for manufacture. Documentation, analysis, and correction of design errors and changes not requiring formal Design Review Committee Action will, as a minimum, receive independent Engineering and Quality Assurance review of the change.

17.1.3.3 Tampa Division

Tampa Division is responsible for the design of steam generators and pressurizers. The design effort is based upon an equipment specification from PWR Systems Division. The Engineering group is responsible for thermal, hydraulic, structural and mechanical design and analysis, and material selection. The Structural Mechanics section is responsible for vibration and shock analysis, experimental stress analysis, general stress analysis, and materials behavior. Design verification activities are performed by individuals within the Tampa Engineering Department other than those who performed the original design.

Prior to releasing drawings for manufacture or purchase, Quality Assurance reviews drawings for conformance to ASME Code. Included in the review is assurance that all necessary dimensions and tolerances are shown to establish requirements for special tools; that material

specified is in accordance with ASME Code requirements; welding specifications are compatible with material; the correct nondestructive examinations are specified; any special characteristics are clearly identified on the drawing. The quality assurance engineer signifies review and approval by signing the drawing when above points have been satisfied. Design changes made as a result of reviews, or other experience in manufacturing, installation or use, are documented and included as drawing revisions. All drawing revisions are reviewed and approved in a manner similar to the original drawings. Planned and documented design reviews are conducted by Engineering to assure that the product being designed and manufactured meets all contractual and code requirements. These reviews provide assurance that nuclear effects, mechanical, thermal, hydraulic, metallurgical, safety and similar type studies are complete, that research and development programs and tests, if necessary, provide adequate substantiation of the design. Compatibility of materials and design interfaces is assured and standard materials, components and processes are used where possible. Adequate accessibility for "In-Service-Inspection," maintenance or repair is designed into the product as well as specifying acceptance criteria for inspections and tests. Each design review is documented for permanent file and includes coverage of significant problems, decisions, the action taken or proposed, and follow-up to assure completion.

The Metallurgy Department is responsible for the quality related functions of material approval, welding process qualification, welder qualification, and resolution of metallurgical problems.

17.1.3.4 Pensacola Division

Pensacola Division is responsible for detail design of structural components for internals of the Westinghouse pressurized water reactor.

Design Engineering initiates a contract design specification utilizing the general order and other applicable documentation. The contract design specification is certified to be in compliance with the ASME Code by a Registered Professional Engineer and then utilized as a basis for preparation of detail drawings and specifications.

All design documents (drawings, specifications, etc.) are reviewed by Quality Assurance Engineering and Manufacturing Engineering for adequacy with respect to clarity, Code compliance, adequate dimensioning, proper specification of special processes, etc. Original documents and any subsequent changes are signed by the cognizant representatives of Quality Assurance Engineering and Manufacturing Engineering.

Design documents are issued for manufacturing use via a design release, contents of which are displayed for shop usage on a periodically issued computer print-out. This document assures that only correct document revisions are utilized. During the time that drawings are being produced for the product, a stress report is being prepared. This stress report is reviewed within the Engineering Department by person(s) other than the individual (s) responsible for the design. Upon completion, the stress report is certified to be in compliance with the Code by a Registered Professional Engineer. Modification of design drawings issued subsequent to the original stress analysis or variations of drawing content in construction may require an addendum to the stress report. This decision is made by the cognizant Engineering personnel. The addendum is reviewed and certified in the same manner as the original stress report.

A program of design verification is applied to ensure that the design is technically adequate and the design meets the requirements of the design specification. This verification program includes one or more of the following: 1) alternate calculations; 2) engineering and other

tests; and 3) basic and formal design reviews. Design reviews will be the primary method of design verifications. The Engineering Manager provides a schedule of product design tasks that require design reviews to the Quality Assurance Manager. Quality Assurance ensures that proper documentation exists for each of the designated design reviews.

17.1.3.5 Specialty Metals Divisions

Product is provided to Tampa Division and Electro-Mechanical Division in accordance to detailed specification requirements. No product design is performed by Specialty Metals Division.

17.1.3.6 Nuclear Service Division

Appropriate design control measures are in effect for the component handling equipment supplied and important service tooling which may be used in pre-operational services.

17.1.3.7 Design Interface Control

Interfaces between participating design organizations are documented to define the responsibilities between participating Water Reactor Divisions. Within PWR Systems Division, shop order Logic Flow Diagrams document the relationships among the many design, procurement, control and administrative activities required to conduct the business of the line organizations. Additionally, the flow diagrams serve to document and show by roadmap how PWRSD complies with 10CFR50 Appendix B. The level of detail depicted on the flow diagram is intended to: optimally portray management controls, provide an easy means of education, and to facilitate the audit-ability of these controls.

PWR SD, as the Lead Division within the Water Reactor Divisions establishes the design criteria and parameters for systems structures and equipment. This information is transmitted in the form of equipment specifications or drawings to the manufacturer. In some cases the manufacturer is responsible for providing a detail design or process procedure based upon the PWR SD criteria and parameters. These are submitted by the supplier to PWR SD where they are reviewed and approved prior to their use in equipment manufacture. Document submittal requirements are clearly stated in purchase orders or in the case of the other Water Reactor Divisions in written interface agreements.

Table 17-5, which is an extract from a typical shop order Logic Flow Diagram, depicts the above process for review and approval of supplier submittals, noting the specific interfaces, applicable documents for detailed instructions, and appropriate criteria of 10CFR50 Appendix B.

In addition to the interface between PWR SD and manufacturers, there is an interface with the applicant and his design agents. PWR SD equipment specifications, fluid flow diagrams, and drawings are transmitted to the applicant or his design agents for information and use. Each project manager has a written procedure defining the process for transmittal of these documents and for controlling the status of action items and inquiries received from the applicant.

17.1.4 PROCUREMENT DOCUMENT CONTROL

Water Reactor Divisions procurements are from approved sources of supply; procurement documents are originated, reviewed, and issued as defined herein and further detailed in Section 17.1.6. In general, the procurement of components, systems, structures, material, and replacement parts within WRD falls into three distinct areas:

1. Components procured by PWRSD from other Water Reactor Divisions.

2. Components, systems and structures procured by PWR SD from suppliers and Westinghouse divisions outside WRD.
3. Materials procured by Water Reactor Divisions.

Relationship of the various Water Reactor Divisions is discussed in detail in Section 17.1.1.

17.1.4.1 PWR Systems Division

As described in Section 17.1.3, equipment specifications and drawings receive a detailed review prior to issuance. Purchase orders reference equipment specifications and drawings as a technical basis of procurement. Engineering personnel are responsible for the review of technical requirement translation from the purchase requisition to the purchase order. An internal procedure requires quality engineers to review purchase requisitions, purchase orders and subsequent legislation change notices as a parallel action to their processing. The review process covers quality assurance related aspects to determine that the purchase order defines the equipment being procured, clearly identifies quality requirements (including requisite techniques for controlling these requirements), and includes acceptance criteria. When discrepancies affecting these order parameters are noted in the purchase or change requisition, a written request for correction is directed to Engineering with a copy to Purchasing (buyer) identifying the point to which order processing by supplier may proceed (without effect on quality related activities) prior to resolution of the discrepancy. The quality engineer's action is reviewed and countersigned by Product Assurance management. Engineering management concurrence with the determination of the stop point is obtained and noted on the request for correction. A similar system is used in the review and correction of purchase orders.

Quality requirements, including documentation preparation, retention and submittal requirements, that apply specifically to a component are contained in the equipment specifications and procurement documents.

Quality system requirements of a general nature are contained in two standard documents, entitled "Quality Control System Requirements," (QCS-1 and QCS-2). Complementary administrative requirements defining such matters as supplier-Westinghouse communication flow patterns and forms to be used are contained in the "Administrative Specification for the Procurement of Nuclear Steam Supply System Components" and applied to each order for NSSS equipment. A prior revision of this specification carried an appendix which contained quality assurance system requirements, and this revision continues in effect for some orders.

Both QCS-1 and QCS-2 provide a basis for Westinghouse review and approval of the supplier's quality assurance program. Normally, this occurs prior to fabrication of ordered components. On occasion, judgement is exercised (and documented in pre-award survey or audit report) to proceed with fabrication on a conditional approval basis where identified supplier shortcomings are considered to be on a proper schedule for correction and also of a nature that will not affect the quality of the product being fabricated.

One of these two documents is applied to each component purchase order for safety-related NSSS equipment and major components, including replacement parts. Appropriate modification, deletions or additions are made where necessary to fit the quality systems requirements to the needs of the equipment being ordered. Both documents require the supplier not only to manufacture equipment that conforms to purchase order requirements, but to assure himself and Westinghouse by maintenance of a comprehensive quality assurance system, including appropriate inspections and tests, that the equipment conforms to these requirements.

The QCS-1 document contains the applicable requirements of 10CFR50, Appendix B, which are imposed upon PWRSD suppliers of safety-related equipment and sub-tier suppliers, as appropriate; it also satisfies the

ASME Code, Section III, and incorporates essential provisions of ANSI N45.2 and other quality-related ANSI standards. The QCS-2 document also contains the applicable requirements of 10CFR50, Appendix B in a direct and more abbreviated format suitable to procurement of less complex components and equipment.

As required, hold points are specified in the equipment specification or elsewhere in the purchase order. These are points of witness or inspection by Westinghouse beyond which work may not proceed without approval by PWRSD.

Procurement documents identify the documentation required for review and submittal, such as drawings, specifications, procedures, inspection plans, inspection and test records, personnel and procedure qualifications, and material test reports.

Standard terms and conditions (identified as 101971A) are appended to each purchase order and contain the right of access to the supplier's facility and related records for source inspection.

NSSS equipment ordered by PWR Systems Division from the other Water Reactor Divisions is specified by equipment specifications or drawings. Quality Assurance Program requirements are satisfied by requiring Water Reactor Divisions to perform their work in accordance with 10CFR50 Appendix B and applicable regulatory requirements as defined herein.

A Product Assurance procedure requires quality engineers to review renewal equipment purchase documents to insure that appropriate quality requirements and acceptance criteria are applied. This review also determines that the initiating procurement documents have been prepared or reviewed by engineering personnel who are familiar with the design, so that renewal equipment similarity and compatibility to the original design is considered.

17.1.4.2 Electro-Mechanical Division

Standardized Material Ordering Drawings, designed, reviewed, and approved by Design Engineering and Quality Assurance Engineering prior to issuance, are used to delineate all regulatory, code, specification, quality assurance, and design requirements in conjunction with the governing engineering design drawing. Elements such as suppliers' systems, procedures, drawings, specifications, inspection, and test records required to be submitted for purchaser's review and approval are specified in a combination of the Material Ordering Drawing and the applicable purchase order.

Nonconformances from procurement requirements are documented and reported for dispositioning.

The Quality Program provides for the review of all procurement requirements by the Quality Assurance Department, as well as a supplier evaluation system for ascertaining suppliers' capabilities to comply with procurement requirements.

Changes and revisions to procurement requirements, as well as orders for replacement parts, are subject to the same reviews and approvals as the original procurement documents.

17.1.4.3 Tampa Division

Procurement procedures are established to assure that materials and components are purchased from suppliers who have been audited and approved as having the ability to comply with applicable codes and specifications. Vendor procedures used to implement Tampa Division purchase order requirements are reviewed for adequacy and compatibility to ensure that regulatory, code, design and quality standards are complied to or

exceeded. One of the inspection codes, one (1) through three (3) and number five (5) is designated on the Purchase Requisition to denote general inspection requirements. Code four (4) relates to non-product items such as light bulbs, stationery, etc. All purchase requisitions for Codes 1, 2, 3 and 5 are reviewed by the Quality Assurance Engineering Department to determine that essential quality assurance requirements and related documentation required for approval, acceptance and release of material are properly specified.

17.1.4.4 Pensacola Division

Quality Assurance Engineering reviews and signs all purchase orders prior to placement. The purpose of this review is to assure that each order properly addresses specific factors as applicable:

- a. ASME Code and other contractual requirements
- b. Supplier quality assurance program requirements
- c. Requirements for supplier submittals and document maintenance
- d. Provisions for source inspection, part identification, and non-compliance resolution.
- e. All inclusions and references required for clarity and proper order fulfillment.

All purchase order changes are reviewed to the same criteria as original orders and signed by the same organizations.

17.1.4.5 Specialty Metals Division

The Purchasing Department is responsible for initiating raw material purchase requisitions in accordance with Tampa and NFD requirements. Purchase requisitions are reviewed by the Quality Control and Inspection, Quality Services, and Manufacturing Engineering departments prior to issue. Applicable quality system requirements are specified, as well as references to technical specifications.

17.1.4.6 Nuclear Service Division

Divisional procedures on quality levels, procurement quality requirements and preparation of purchase requisitions and change notices require, as a minimum, that all safety related procurement requisition are reviewed and concurred with by NSD Product Assurance. Reviews of purchase orders and purchase change notices assure that the eventual supplier contractual requirements are complete and correct.

Procurement documents include appropriate requirements for supplier QA programs, listing of basic technical requirements, supplier documentation submittals, extension of quality requirements to lower tier procurements and identification of Westinghouse source inspection and release points.

17.1.5 INSTRUCTIONS, PROCEDURES AND DRAWINGS

Within WRD, written procedures and instructions are in use to implement the Quality Assurance Program, and provide assurance that activities affecting quality in the context of 10CFR50, Appendix B, are documented (Reference Table 17-2). They are in formats appropriate to their applications, such as:

1. Management Responsibility Statements (Appointment Letters)
2. Position Descriptions of Management Positions and Professional Classifications
3. Engineering Instructions
4. Product Assurance Procedures
5. Projects Procedures
6. Purchasing Procedures
7. Construction Site Procedures

Each of the above contains detailed procedures and instructions relating to the functioning of the quality program. Approval and distribution of the procedures is controlled by the manager responsible.

Table 17-2 relates the various WRD manuals and written procedures to the applicable NRC criteria.

Technical and contractual information necessary to assure effective implementation of these policies and procedures is developed, documented and controlled through a standard Westinghouse system which consists, in part, of the establishment of:

1. System Design Parameters
2. Equipment Specifications
3. Process Specifications
4. Purchasing Department Specifications (including specifications for materials)
5. Drawings, and Bills of Material

6. Purchase Orders

7. Quality Assurance Procedures

The Quality Assurance Program provides that activities affecting quality will be accomplished in accordance with documented instructions, procedures and drawings and that appropriate quantitative and qualitative means of verifying quality are satisfactorily accomplished and included as appropriate.

17.1.5.1 PWR Systems Division

The quality assurance program is documented by policies and procedure statements approved by division management by manuals within each of the departments, and by specifications, drawings and other instructions in accordance with the description in Section 17.1.5.

17.1.5.2 Electro-Mechanical Division

Systems and controls for activities affecting quality are described in the Quality Program Manual. The Quality Assurance Engineering department is responsible for generating detailed written procedures and instructions delineating how the activity is to be performed and controlled.

In addition, where applicable, specifications and drawings are issued to assure that appropriate quantitative and qualitative acceptance criteria are adequately prescribed. All such documents, which involve interface and/or interdepartmental responsibilities, are reviewed by the departments involved for concurrence.

17.1.5.3 Tampa Division

Process Specifications, Manufacturing Procedures and Standard Division Procedures are established as required to detail the necessary work and flow parameters to be followed which ensure the continuity and control of processes and systems for compliance to specified regulatory and Code requirements. The design parameters and necessary processes required to meet contractual and Code requirements are detailed on drawings which, along with an operational line-up, form the working documents to which the Manufacturing Department operates.

Manufacturing prepares an operational line-up consisting of sequential operations necessary to fulfill the design and regulatory requirements stipulated by the drawing and associated specifications and procedures. Quality Assurance reviews these line-ups and stamps or signs their approval. A computerized master is made and reviewed and a feeder pack consisting of the line-up (runoff from the computerized master) and drawings necessary to manufacture the desired item is issued. Quality Control uses a duplicate of the manufacturing line-up in a suitable form, called an I.P.P. ("Inspection Point Program" also runoff from the computerized master), to perform and sign off all required non destructive testing, special inspections and related documentation. A "G" Letter (Engineer's Change in Manufacturing Information) is issued to the shop in lieu of a drawing change for immediate implementation and incorporation into the affected shop orders. This "G" Letter specifies whether or not an EMI (Emergency Manufacturing Information Line-up) is required. If not, the "G" Letter is the official working document. In either case, Quality Assurance provides the necessary I.P.P. to perform, approve and document the required information.

17.1.5.4 Pensacola Division

Usage of specific instructional, administrative, contractual and reporting forms is controlled by internal procedures with respect to content, distribution, review sign-off, and retention. Interdepartmental functions and relationships are controlled through use of internal procedures (PE's). These are signed by all departments involved and implementation is verified through the internal audit program.

17.1.5.5 Specialty Metals Division

Written procedures exist for activities affecting quality in individual manuals of each of the following SMD departments - Quality Control, Quality Services, Process Engineering, Marketing and Production Control, Purchasing, and Works Engineering.

Each Department Manager is responsible for issuing and control of his departments procedures. All procedures issued must have quality control approval, except Quality Services, where acknowledgement by QC is required.

As appropriate, all procedures issued contain the following:

1. Applicable customer requirements
2. Equipment, gages, and test standards required
3. Recognized ASTM, etc., methods
4. Frequency and locations of inspections and tests

5. Accept/reject criteria
6. Calibration method
7. Action required when non-conforming or out of specification condition is detected
8. Disposition of non-conforming material
9. Special data recording methods
10. Responsibilities for implementation of the procedure
11. Operation or method description
12. Issue and change approvals
13. Training and qualification requirements
14. Records retention requirements

17.1.5.6 Nuclear Service Division

Activities affecting quality performed within the NSD scope of equipment and services supply are prescribed and are carried out in accordance with applicable instructions, procedures, and drawings, which include required quantitative and qualitative acceptance criteria.

17.1.6 DOCUMENT CONTROL

Each of the Water Reactor Divisions provides measures to assure documents are available prior to performing work are effectively controlled.

Below is a description of the document control procedures which provide methods for establishing control of instructions, drawings and procedures related to quality and safety. In addition, these procedures provide a means to assure that the proper document revisions are used; that controls are exercised for document changes; and that review and approval of changes are performed by organizations who originated the document.

17.1.6.1 PWR Systems Division

Within PWRSD there are a variety of documents used in the design and procurement of the PWR plant equipment. In the paragraphs below the controls in use to verify content adequacy and achieve correct distribution are discussed.

The various sources of PWRSD procedures relating to Quality Assurance are summarized on Table 17-2. Each of the manuals has written instructions describing the review, approval, distribution and revision of procedures. Typically the preparation of new or revised procedures is controlled by the department responsible for the manual. Prior to issue, proposed procedures are routed to interfacing groups for review. Approval is the responsibility of the department manager who assures the completeness and resolution of the review. Manuals are controlled and assigned to specific individuals. Distribution of new and revised procedures is made to each person assigned a manual. Manual holders are responsible for updating their manuals. Implementation of most procedures is at date of issue and is clearly defined by the distribution letter. In exceptional instances when implementation varies from the issue date, specific instructions are provided in the body of the procedure.

Design information is provided by equipment specifications and drawings. Procedures define the methods used for issuance of new and revised drawings and equipment specifications, establish approval requirements, and designate that reviews shall be made, as required, by involved groups in their area of cognizance. When drawings are used in lieu of equipment specifications, these drawings are processed and controlled in the same manner as the specifications.

The manager of the originating group is the person responsible to assure, before approving the document, that all steps required by instructions have been completed satisfactorily. This includes the proper review, and the resolution of written comments, as well as the technical adequacy of the document. Both drawings and equipment specifications are provided to central control groups from which distributions are made.

Approved drawings are microfilmed and distributed. Past revisions are available only from the central file. Since more than one revision to a drawing is applicable to different plants, a computerized drawing control system defines applicability for specific revisions of drawings. When a new or revised drawing is sent to central files it is accompanied by an applicability form which is the input to the computer system. Drawing lists are issued monthly. The written drawing control system instructs division personnel to determine applicability of a drawing by referral to the drawing lists.

Lists of current revisions of equipment specifications are used in the same manner as drawing lists. Procurement documents are sequentially serialized and identified with the purchase order number; the status of documents on orders is available for review as required.

Westinghouse process specifications, that is, specifications that detail fabrication, inspection and testing requirements are handled in a similar manner as equipment specifications.

Procurement documents are controlled by the Purchases and Traffic department. The purchasing manual contains written instructions which detail how purchase orders, purchase order change notices and procurement advisory releases are originated, reviewed, approved and distributed. The instructions specify that sequential unique numbers be applied to all procurement documents. A computerized system identifies the latest serial number used on each document within the purchase order. Quality system specifications require that suppliers apply systems to assure use of proper specifications and procedures, to avoid use of obsolete or superseded documents, and to provide documents at the onset of the work for which they are needed.

Written instructions define the requirements for transmittal of documents to the applicant. Prior to distribution the applicability of each document is assured by the review and approval of Engineering and Projects personnel. Quality releases are forwarded to the site by equipment manufacturers. The quality release system is described in Section 17.1.7. Computerized reports are issued twice a month to identify the quality releases applicable to site delivered PWR plant equipment.

17.1.6.2 Electro-Mechanical Division

Manuals, as summarized in Table 17-2 are developed and maintained in a manner as described for PWRSD manuals in Section 17.1.6.1. The Quality Manual is the responsibility of the Quality Assurance manager. Where action and responsibilities of the departments are affected, the managers of these departments also approve related sections. The manual is reviewed on a scheduled basis and revised as necessary. As revisions are approved, Quality Assurance supplies copies of changed sections to the manual holders.

Procedures covering component processing, inspection and testing are prepared, reviewed and approved for incorporation into manufacturing routings as part of engineering planning. These procedures are either incorporated directly into the manufacturing routing or are referenced in separate inspection and test instructions. All documents, including changes and revisions, are reviewed for adequacy and approved for release by authorized personnel, as described in Section 17.1.3.2 and 17.1.4.2.

Electronic data processing is utilized in preparing and maintaining drawing and specification lists showing the applicable revision. These lists are strategically located in the factory and office area. The drawing and specification distribution control system assures that current information is available to the user and that manufacturing information is upgraded.

17.1.6.3 Tampa Division

Control is maintained over the issuance of all design, welding, non-destructive examination and manufacturing documents affecting quality. Each drawing is reviewed and signed by Engineering, Metallurgy, Quality Assurance and Manufacturing prior to release to the drawing control center. Copies of the drawing are prepared from aperture cards for transmittal to the Production Planning of the Manufacturing Department, who in turn prepare a feeder package that includes the necessary drawing stamped with the applicable shop order number and distributes the complete package to the applicable manufacturing group. Each department is responsible for maintaining only up-to-date drawings. The drawing control center issues a master engineering drawing list. This drawing list contains all drawing numbers in the active category including the latest revision. Distribution of the list, which is issued as a secondary control for double-checking of drawing revisions, is made to appropriate department managers, including Quality Assurance.

Procedures that include welding, nondestructive examinations and manufacturing are maintained and controlled through the Metallurgical group. Serialized Tampa Specifications Manuals are issued to appropriate individuals in each department. New and revised specifications are distributed to manual holders who are responsible to insert the new specification and destroy the outdated specification. Each specification is identified by a specific number. This number is shown on the drawing, dictating the procedure to be used for each specific operation, i.e. welding, nondestructive examination, cleaning, etc.

Tampa Quality Assurance Instructions (T.Q.A.I.) are issued to all Quality Assurance and Quality Control personnel by Quality Assurance Department. The purpose of these instructions is to detail specific functions and **responsibilities of Quality Assurance and Quality Control personnel**, i.e. EAN System, quality release, Inspection Stamp Issue, etc. These instructions are numbered and updated as necessary.

Tampa specifications are reviewed, approved and signed by a method similar to that used for drawings, with one notable exception, the Division Safety Engineer also reviews and approves each Tampa Process Specification and Manufacturing Procedure. Additional discussions of document controls are contained in Sections 17.1.3.3, 17.1.4.3, 17.1.9.3 and 17.1.10.3.

17.1.6.4 Pensacola Division

As stated in 17.1.5.4, internal procedures define the correct usage of all documents that are involved in the Quality Assurance program. Revision control listings (largely computer generated) are utilized to assure that the correct document is used.

Originals of most documents utilized for manufacturing are retained in a centralized location and issued on demand.

17.1.6.5 Specialty Metals Division

The content and issuance of manufacturing, engineering, and quality information to the manufacturing, inspection, and test areas of the shop is controlled. An authorized change notice system controls process and/or inspection changes. Discussions of document controls are contained in Sections 17.1.3.5, 17.1.4.5, 17.1.9.5 and 17.1.10.5. Manuals are controlled as discussed in Section 17.1.6.1 for PWRSD.

17.1.6.6 Nuclear Service Division

Activities within the NSD scope which affect quality are governed by controlled documents such as procedures within the division operating and departmental manuals, equipment specifications, drawings and test procedures. The control of the division and departmental manuals is defined within each manual with regard to responsibilities for preparation, revision, review, approval, and distribution. NSD utilizes the PWRSD systems described in 17.1.6.1 for the control of equipment specifications, drawings and process specifications. Special test procedures of a developmental nature are prepared and controlled by a Technical Operations manual procedure.

17.1.7 CONTROL OF PURCHASED MATERIAL, EQUIPMENT AND SERVICES

Each of the Water Reactor Divisions maintains its own system for control of purchased items. In general, the items purchased by the manufacturing divisions are in the raw materials category and the controls therefore are of a different nature than those used by PWRSD. However, the principles of supplier evaluation and selection, auditing, and documentation of quality are applied by all the Water Reactor Divisions.

Westinghouse policies and procedures for procurement control follow the guidance of ANSI N45.2.13 (Draft 2, Revision 4, April 1974), Supplementary

Quality Assurance Requirements for Control of Procurement of Equipment Materials and Services for Nuclear Power Plants, for safety-related equipment. Concerning the examples of procurement methods shown in the Appendix to N45.2.13, provisions for changing quality assurance programs in paragraphs 6.1.e and 6.2.d are understood by Westinghouse to allow flexibility in making improvements and other necessary modifications to quality assurance procedures and methods. Such modifications may be applied in a timely manner, and are subject to review by the applicant. Information on the changes will be provided to the applicant through the normal distribution of revisions to quality assurance manuals.

Westinghouse control of suppliers operates in like manner. After initial evaluation and approval of the supplier's program, a determination of the need to re-audit the supplier's quality assurance program is made annually. Between evaluations, suppliers may modify their quality assurance program as necessary, within the prescribed Westinghouse order requirement, with the understanding that information on major revisions is to be provided to Westinghouse. Westinghouse maintains an overview of the supplier's quality assurance program application by surveillance, audits and other business interactions. The procurement control methods Westinghouse uses, as applied to each tier of supply, are described throughout this section. These methods include such activities as: supplier evaluation and selection, insertion of appropriate quality assurance requirements into purchase orders, and source surveillance.

WRD furnishes for each component shipped to the construction site a copy of the purchase order, including changes; approved deviation notices describing variation from the purchase order requirements; the design specification; and a quality release. These documents certify component quality and satisfy regulatory requirements pertaining to site documentation.

The Quality Release is a WRD certification document which contains:

1. The purchase order number and specific identification of the procured item.

2. Certification that the equipment meets requirements of the purchase order, drawings and specifications. Identification of those procurement requirements which have not been met, with notation of approved deviation notices. In addition, contingent conditions which require additional action after delivery of equipment to the site are identified. Westinghouse defines the necessary action and monitors close-out. Completion of action is documented by the issuance of a Supplemental Quality Release.
3. The authorizing signature on a quality release is that of a WRD Quality Assurance representative, or in specifically authorized situations, a member of the supplier's quality organization.

Each Water Reactor Divisions has a documented procedure which describes the requirements for completing, authorizing, issuing, distributing and revising quality releases. Periodically, PWRSD audits the equipment release system of the Water Reactor Divisions. These audits are performed in accordance with a written checklist. Audit reports are distributed to cognizant management for correction of deficiencies.

17.1.7.1.1 PWRSD Procurement Controls Applicable to Water Reactor Divisions Which Furnish NSSS Equipment

PWRSD issues a general order to initiate procurement of NSSS equipment from the Tampa, Pensacola and Electro-Mechanical Divisions. The general order identifies the type of equipment, quantity and shipping schedule. Equipment specifications are prepared and issued by PWRSD to define the detailed requirements for the specific application. Three of the Water Reactor Divisions (Tampa, Pensacola and EMD) have been delegated the responsibility for the detailed design, fabrication, quality verification and release of the equipment in accordance with the PWRSD procurement requirements. These divisions design the equipment under their own design verification and control systems.

These Water Reactor Divisions are responsible to establish and maintain effective quality assurance programs which meet the requirements of 10CFR50 Appendix B, this program, and Section III of the ASME Boiler and Pressure Vessel Code. The divisions perform the receiving, in-process and acceptance tests/inspections and issue a quality release, certifying compliance with the PWRSD procurement requirements. After release of the equipment a copy of the supporting data package is submitted to PWRSD for retention with the other NSSS inspection and test record. SMD provides materials to Tampa, Pensacola, and EMD in accordance with specific requirements defined by those divisions, and under the quality assurance program described herein.

As described in Section 17.1.18.3.1, the application of the quality assurance program by Water Reactor Divisions supplying NSSS equipment is audited by PWRSD. The application of the SMD quality assurance program is audited by the Water Reactor Division being supplied.

17.1.7.1.2 PWRSD Procurement Controls Applicable To Suppliers

Prior to placing a purchase order with a new supplier a survey is conducted in accordance with a written checklist by personnel from Purchasing, Engineering, and Product Assurance. Other personnel such as material and process engineers and manufacturing engineers participate as required. The results are documented in a report issued to cognizant management personnel. The survey and evaluation considerations include the elements of the NRC's Quality Assurance Criteria to the extent these criteria are applicable to the equipment being procured. Actions to correct deficiencies in the supplier's organization or systems are resolved with the supplier's management prior to fabrication of ordered components. If an existing supplier does not maintain the required quality, appropriate PWRSD personnel may visit the supplier to review his problems and make recommendations to the supplier's management to correct the situation. PWRSD personnel will include specialists to aid the supplier in specific problem areas such as welding, manufacturing and nondestructive examination. In

this manner, Westinghouse assures the continued high level of supplier performance necessary to obtain the quality required by the contract.

Requirements to be fulfilled by the supplier are detailed in the procurement document which includes an appropriate Quality Control Systems Requirements Specification, such as QCS-1. This document details aspects of supplier quality assurance, for example, inspection reports, provisions for inspection equipment calibration prior to use, and provision for comprehensive inspection after component repair.

PWRSD surveillance of suppliers during fabrication, inspection, testing and release of components is planned in advance and performed in accordance with written quality plans. These plans are prepared by Product Assurance engineers and are based on the technical requirements of the procurement specifications. The plans are reviewed and approved by Product Assurance management.

The purpose of a quality plan is to provide planned guidance to the Quality Assurance Surveillance representative by (1) identifying those characteristics which are most important to quality and reliability, and (2) providing specific instructions for the witnessing, documentation, and acceptance of the equipment.

The plan identifies the type of supplier documents requiring approval and the points during manufacturing and test that Quality Assurance intends to witness. Special emphasis is placed on the aspects of manufacture and inspection that most directly affect performance of the equipment. Lead units of a new design get particular attention in the supplier's shop by both Quality Assurance and Engineering representatives.

When planning the surveillance activities, the Quality Assurance Surveillance representative prepares surveillance worksheets. These worksheets are used to follow changes to the procurement documents, to

follow supplier submittals and their approval status, to record those events witnessed, and to provide a summary of Quality Releases issued for the specific purchase order.

The frequency and scope of surveillance varies with degree of importance of equipment, supplier performance, and complexity of the components. Visits to new suppliers are more frequent during the early stages of manufacture, with frequency diminishing as the supplier demonstrates his capability.

Surveillance is accomplished in accordance with the Quality Plans described above. The purpose of PWRSD surveillance of suppliers is to obtain first-hand objective assurance of compliance with requirements. The principle applied is that the supplier is responsible for inspecting and testing his product, and that surveillance activities are directed at determination of the effectiveness of the supplier's actions. During the surveillance visits, the surveillance representative sees that written instructions and procedures exist and are kept current, that corrective action is implemented, and that other necessary controls are effective. He performs systems auditing functions in addition to reviewing product, processes and records according to the quality plan. The Quality Assurance Surveillance representative informs, in writing, the supplier directly of significant problems he discovers and obtains commitments to correct them. He brings these problems to the attention of the supplier's management as required to obtain resolution. PWRSD management is made aware of the surveillance activities, including supplier performance and problem areas, by means of the trip report issued by the Quality Assurance representative for each visit to a vendor.

Periodically, as the need is determined, re-audit of certain suppliers is performed by Product Assurance; the re-audit is directed at the

supplier's total quality assurance system or to specific aspects where the supplier's performance indicates need for follow-up review to secure improvement.

When the Quality Assurance representative is satisfied that the equipment can be released for shipment, he prepares a quality release form, and copies are distributed to the supplier and cognizant personnel within PWRSD. The equipment can then be released through normal engineering-purchasing channels for shipment. The supplier forwards the quality release with the equipment to the plant site.

PWRSD has no direct responsibility for receipt inspection of equipment at the site. The applicant or his designated representative establishes the site receiving activities. PWRSD provides recommendations to the applicant for handling and storage of equipment and the documentation as described in Section 17.1.7 to assure quality.

In some instances the supplier is authorized by PWRSD to prepare a supplier quality release. This authorization is given only to those suppliers who have, over a period of time, demonstrated an effective quality system. PWRSD Product Assurance personnel periodically audit the supplier's system to assure continued performance.

17.1.7.2 Electro-Mechanical Division

Prior to the award of purchase orders, Quality Assurance performs a survey to evaluate and approve procurement sources for purchased material or services covered by the Quality Program.

Based upon the type of component to be manufactured, the vendor may be required to submit process outlines and procedures (covering non-destructive examination, manufacturing and/or inspection) to EMD for either information or approval prior to manufacture. Such submittals when specified,

are reviewed by cognizant engineering personnel to assure adequate material control and conformance to drawing, specification and purchase order requirements. In addition, EMD maintains a comprehensive supplier surveillance program. Suppliers are visited on a scheduled basis and audit reports formulated, evaluated and maintained on file for future reference. On complex purchased items, a Quality Assurance Engineering field representative may visit the supplier's facility to witness non-destructive or destructive examination or to perform verification of dimensional inspection. As required by applicable purchase orders, Quality Assurance Engineering releases material for shipment. The Quality Assurance Engineering field representative, after acceptance, documents the results of source inspections and releases by means of the Quality Control Release. This release along with other specified supplier documentation accompanies shipments of material to EMD receiving Inspection.

Upon the receipt of supplier furnished material, certified reports and related documents are reviewed and components inspected by receiving inspection for compliance to the purchase order and related ordering data in accordance with instructions prepared and issued by Quality Assurance Engineering. After acceptance, the received material is forwarded to controlled stores or released directly to manufacturing. Non-conforming material is identified and controlled until proper disposition is made.

17.1.7.3 Tampa Division

Established controls assure that all purchased materials conform to purchase order requirements, including material and drawing specifications. It is Tampa Division's policy to formally release to the Manufacturing Department all materials and parts that are to be used in NSSS equipment.

A Tampa Division team consisting of two or more selected personnel audits a new supplier's operation to determine acceptability as a supplier. For pressure boundary or safety related components, this supplier survey is conducted prior to procurement. The auditors are selected from the Quality Assurance, Metallurgy, Reliability, Purchasing or Engineering Departments. The Quality Assurance Department conducts surveillance inspections and audits as necessary to assure acceptable quality products.

Source inspection is performed on pressure boundary material, plates, forgings, castings and tubes. Prior to shipment the Tampa quality representative will inspect, complete a source inspection form and identify the material with the assigned test number and purchase order number.

A copy of the purchase order's applicable specifications, drawings and prior source inspection data is furnished to the receiving inspection section. Inspection of incoming material, not subject to source quality assurance, but requiring in-house inspection, is accomplished by Quality Control.

17.1.7.4 Pensacola Division

The approved supplier's list is central to the control of procurement at Pensacola Division. Orders are placed only with listed firms who have specific capabilities required.

New suppliers are evaluated at their facility (utilizing formal audit checklists) prior to placement on the approved supplier list. Continued surveillance of suppliers already listed is maintained through monitoring of receiving inspection rejection rates, source surveillance by Quality

Assurance Engineering and re-appraisal of supplier. Suppliers who fail to perform adequately are removed from the approved list.

Upon receipt of supplier furnished material the following Quality Assurance actions are initiated:

1. Verification that all certified test reports, letters of compliance, dimensional data, welding records, heat-treat charts, etc. required by the purchase order have been supplied by the vendor and are complete and correct.
2. Inspection of the product or material to determine acceptability according to instructions issued by the cognizant quality engineer.
3. If the product is accepted and released by Quality Assurance, the material, component, or assembly is forwarded to a controlled storage area to await future use, or is released directly to Manufacturing.
4. If the product is rejected, the defective product is held in a controlled area until proper evaluation and disposition is made.

All actions relevant to procurement are controlled by detailed written procedures and subject to audit at regular intervals.

17.1.7.5 Specialty Metals Division

Subcontractors are limited to those which have demonstrated their capabilities. They are formally evaluated and selected on the basis of the capability of their quality system and quality of raw material. Incoming lots from vendors are checked chemically and by sampling techniques to verify supplier test reports and certifications. Quality Control and

Inspection maintains records of the quality performance of each supplier. These records are maintained to rate suppliers as to their performance and to aid in developing and improving the suppliers' quality program.

Annually, Quality Control and Inspection personnel make surveillance visits to raw material suppliers to assure continuous quality of purchased material and to assure that objective evidence of quality is maintained. Information obtained through these visits provides data for determining continuing acceptability of a supplier.

17.1.7.6 Nuclear Service Division

NSD Product Assurance has primary responsibility for the quality control of purchased material, equipment and services on procurements initiated by NSD. In specific cases when NSD judges that appropriate assurance of quality can be produced more economically by PWRSD, NSD may delegate this responsibility to PWRSD. Since the QA practices for NSD and PWRSD are equivalent and NSD utilizes the services of PWRSD purchasing personnel physically located at NSD, the arrangements and communications are managed in an effective manner. Additionally, these responsibilities are formally documented in an interface agreement with PWRSD.

As indicated above, the control extends to pre-award surveys and selection of suppliers, supplier surveillance and audits, and issuance of quality releases for all deliverable hardware.

17.1.8 IDENTIFICATION AND CONTROL OF MATERIAL, PARTS AND COMPONENTS

Within each of the Water Reactor Divisions procedures exist establishing measures which assure that identification and traceability of items is maintained during the production of components and through delivery to the nuclear power plant site.

17.1.8.1 PWR Systems Division

Requirements for identification of NSSS safety-related equipment are contained within the equipment specifications.

For example, systematic use of Standard Plant Item Numbers (SPIN) nomenclature in design descriptions and procurement requirements provides consistency and order in component identification, and compatibility with associated documentation.

QCS-1, QCS-2, and the Administrative Specification contain requirements that a supplier have measures to maintain identification and control of material, parts and components. These include consideration of proper location of identification markings on the part, choice of a location to avoid effects on part function or quality, measures for verification of identity prior to release, and records traceability from part identification. The procedures used to establish these measures and the application of the procedures are reviewed for adequacy during supplier selection and monitored for compliance during the surveillance activities.

17.1.8.2 Electro-Mechanical Division

To assure that unacceptable items are not used, identification is placed on material at the supplier's plant or at EMD dependent upon part end use and processing. This identification remains with the material throughout subsequent manufacturing operations as a control number enabling traceability to the supplier's heat, slab or lot, and test data.

Serialization requirements are determined during the initial planning stages and fall into the following general categories:

1. Specification, contract, material and equipment requirements.
2. Critical components.
3. Non-destructive examination control.
4. Manufacturing control.

The minimum level of identification is shown on the detail, subassembly or assembly drawing, including marking location and method, and takes into consideration that the location and method do not affect function or quality. This identification is also reflected in the manufacturing routing. Sequential serial numbers are issued and assurance against repetition is maintained through serialization log books. Serial numbers are pre-assigned to certain purchased items and included as part of the purchase order requirements.

Heat identity is maintained through all operations when required by contract, material, equipment or code specifications. This identity is maintained by transfer of the heat number from operation to operation and/or by appropriate documentation through the use of sequential serial numbering and serial number log books.

17.1.8.3 Tampa Division

A test number system is used as positive and permanent identification of materials and items purchased. The number identifies the supplier's heat, slab or lot number and the physical and the chemical property records. In instances of multipiece orders, sub numbers are utilized in the event a common melt was used for all items. One major exception is the tube bundle material. In this application, the heat number is used and recorded for each specified tube location in the bundle from definite orientation reference points.

The test numbers consist of a letter and a five digit number that is assigned and affixed or stamped on each piece of material, component, assembly, or set of materials and parts which are for use in the manufactured product. The test number is also recorded as a permanent record in the inspection point program.

Nonconforming material and parts are properly identified until the action prescribed by Error Appraisal Notice has been accomplished. Materials that require additional tests are tagged and held until tests have been accomplished and results evaluated.

17.1.8.4 Pensacola Division

The traceability program at Pensacola Division utilizes placement of a unique identity number on all raw material, component parts, and assemblies. An equivalent lot control system is authorized in some instances.

The identity number provides traceability to mill heat number, drawing number, item number, and manufacturing status. Identity number location is specified by Design Engineering with consideration of item function and integrity.

17.1.8.5 Specialty Metals Division

Permanent identification and marking methods are used for control of materials throughout the manufacturing area. An identifying number is applied or attached to the material as it enters the plant by the receiving inspector. This number is modified as the material is processed; however, the basic number is used for identification in both processing and storing of the material. When a shipment is received, the receiving checker identifies the material and notifies the receiving inspector.

After inspection the receiving report is stamped according to the determined disposition (accept, reject, repair). Traceability to heat number is maintained.

17.1.8.6 Nuclear Service Division

Since NSD does not manufacture equipment, the identification and control of NSD equipment is exercised through the Standard Plant Item Numbers referred to in 17.1.8.1 and requirements contained in purchase orders to suppliers such as referenced equipment specifications and supplier quality program specifications. Surveillance of suppliers assures that they conform to their material identification control procedures.

17.1.9 CONTROL OF SPECIAL PROCESSES

Each of the Water Reactor Divisions has established measures and procedures which maintain control over special processes. These means include the qualification of processes and personnel for welding and inspection in accordance with ASME requirements, nondestructive inspection per SNT-TC-1A standards, and other processes as may be necessary for adequate control. Qualification records files are maintained and are reviewed periodically for currency.

Special processes, such as welding, casting, nondestructive examination, electrochemical machining, explosive forming, cleaning and painting are prescribed by means of documented procedures. For example, paint applications are detailed in documents known as process specifications. These specifications, similar to the equipment specifications discussed in 17.1.3, are process oriented, containing requirements such as; scope of paint application, selection of paint, surface preparation and condition,

method of application, curing, repair of coating, methods of removal, etc. Quality provisions provide for monitoring the process, criteria for visual examination, and checks of paint characteristics such as adhesion, flexibility and thickness.

17.1.9.1 PWR Systems Division

PWRSD personnel who witness non-destructive examinations during surveillance activities are qualified in accordance with a non-destructive testing certification program which conforms to SNT-TC-1A. Active files are kept of qualified personnel, and are periodically reviewed for currency.

QCS-1 and QCS-2 contain requirements that a supplier have measures for control of special processes. The procedures used to implement these measures are reviewed for adequacy and for inclusion of a recorded verification of proper performance on check lists, travelers, or equivalent records. In addition, equipment specifications or purchase orders identify specific processes and personnel qualifications which require PWRSD review and/or approval. Special process procedures and personnel qualifications are required to be maintained under the document control and records retention systems.

The Quality Assurance Surveillance representative monitors the supplier's activities to ensure that special processes are performed properly by qualified personnel using appropriately qualified equipment and approved procedures.

17.1.9.2 Electro-Mechanical Division

Recognizing the need to control special processes, EMD has established departmental responsibilities for developing, reviewing, implementing

and controlling special processes, including the requirements for associated personnel qualifications. Special processes, including welding, heat treatment, and nondestructive examination procedures are reviewed by Quality Assurance Engineering to assure compliance to applicable codes, standards, and specifications.

Welder procedure qualification is conducted in accordance with the ASME Boiler and Pressure Vessel Code Section IX. In addition, the welding process includes a program of weld electrode control. Manufacturing penetrant operators (Level I) and quality control nondestructive examination inspectors (Level II) are qualified to SNT-TC-1A standards. Heat treatment processes are controlled through EMD's calibration program. Special process procedures and credentials of qualified personnel are maintained under document control and records keeping systems.

17.1.9.3 Tampa Division

Definite departmental responsibilities are established to identify the need for, document, and review special process procedures, as well as any associated personnel qualifications. The Metallurgical Department writes all welding and associated procedures including pre-heat and heat treatment. The Quality Assurance and QA/NDE Departments write all nondestructive examination specifications such as radiography, ultrasonics, magnetic particle and liquid penetrant. These process specifications are in accordance with the applicable codes, ASME Sections III and IX. Each process specifically defines the personnel qualification required by the applicable code. Welding qualification procedures and the required documentation are in accordance with the applicable code requirement. All process documents are subject to the controls and reviews noted in Section 17.1.6.

Lists of welders to ASME Section IX qualified and nondestructive examination personnel qualified to SNT-TC-1A are issued to departmental supervisors and the quality assurance technicians; welding records and nondestructive examination reports indicate the individual that performed the welding and the technician that performed the nondestructive examination. Credentials of qualified personnel are maintained under the records program described in 17.1.17.3.

17.1.9.4 Pensacola Division

The Quality Assurance Department, in conjunction with the Engineering Department, identifies, defines and establishes special processes and process controls. Advance quality planning includes identification of the need for qualification programs for special processes, equipment and personnel. Prior to issuing manufacturing information for the processing of the product, all such documents are forwarded to Quality Assurance Engineering for review. This information includes all drawings, specifications, routings and other documents directly involved in processing the products.

Review of these documents by Quality Assurance Engineering consists of verification that special tooling, fixturing or gaging used to determine product quality is indicated at the correct operation/sequence and verification that special testing together with acceptance criteria is in compliance with ordering information.

Upon completion of this review and determination that the required information is complete, correct and adequate, Quality Assurance Engineering completes the document by adding the following: inspection operations to the routing at the applicable phase in processing, inspection methods and procedures, inspection forms to be completed, and,

sampling plans to be applied, if applicable. Special emphasis is focused on control of heat-treating and welding processes. Qualification of personnel, conformance of process to applicable requirements, and records of process data are constantly evaluated. Special process procedures and qualification records of personnel are maintained under document control and records retention programs.

17.1.9.5 Specialty Metals Division

Responsibilities have been established to assure that special processes, such as heat treatment, pickling, cleaning, etc. are specified and defined in manufacturing specifications. Procedure responsibilities, controls and qualifications, as necessary, are outlined in the documents. Inspectors are used by Quality Control & Inspection for maintaining a uniform quality level, to control manufacturing processes and for overall product quality assurance. Several techniques of nondestructive examination are used by Quality Control and Inspection which are required by customer specifications. These are: ultrasonic inspection, eddy current inspection, and liquid penetrant inspection. Special process specifications and credentials of personnel qualifications are maintained under document control and records retention programs.

17.1.9.6 Nuclear Service Division

Special process controls are exercised by NSD in the area of equipment and services falling within the NSD scope. Procurement documents require the qualification of special process procedures and personnel in accordance to codes and SNT-TC-1A. NSD conducts preservice inspection services with SNT-TC-1A qualified personnel using procedures and equipment approved by Level III personnel. NSD Product Assurance personnel are also formally qualified for NDE procedure reviews

and audit functions conducted in connection with procurement of equipment and pre-service inspections.

17.1.10 INSPECTION

Each of the Water Reactor Divisions, in order to insure that attributes affecting quality are controlled, has established measures and procedures by which inspections are performed. As noted earlier, adequate independence exists between inspection groups and manufacturing functions to allow effective, overall controlled conditions.

Physical examinations, measurements, and tests are conducted, as appropriate, to demonstrate product quality. Various job positions within the quality organizations are detailed by written "Position Descriptions" to facilitate use of qualified personnel, with specialized training as necessary and demonstrated proficiency.

17.1.10.1 PWR Systems Division

Since PWRSD does not manufacture anything directly, emphasis is placed on: providing correct and complete requirements to suppliers, supplier performance, and surveillance of supplier systems and product.

The principle followed is that the supplier is responsible for inspecting his product and PWRSD Quality Assurance personnel verify his controls to assure the adequacy of inspection. As such, PWRSD supplier related activities are more appropriately described as supplier surveillance and audit. Details of the PWRSD surveillance program are contained in the description of "Control of Purchased Material, Equipment and Services", Section 17.1.7.

Instructions to suppliers require that the suppliers' inspection procedures provide: an identification of the quality characteristics inspected; inspection planning to provide adequate control, including process monitoring, over characteristics where later direct inspection alone would be disadvantageous: an identification of the group responsible for performing the inspection operation; acceptance criteria; a description of the inspection method; provision for documenting the inspection; results; and disposition. Instructions, specifications and drawings are to be available for inspector use, and inspection equipment is to be within calibration prior to performance of the inspection. Also, the supplier's inspection plan is required to recognize those **PWRSD notification or hold points specified by procurement order**, for witness by PWRSD (or other concerned parties).

Instructions to suppliers require that inspection of repairs or rework made after initial inspection be performed in accordance with original design and inspection requirements or approved acceptable alternatives.

17.1.10.2 Electro-Mechanical Division

The quality program provides for assurance that all fabrication, welding, machining and other operations are performed under controlled conditions. Features include verification of documented work instructions (routings), preparation of procedures for monitoring product quality (Inspection Point Program) and the physical examination and testing at significant points during the manufacturing cycle, including those where inspection at a later stage in processing is not feasible or advantageous. Criteria for approval or rejection is established by Quality Assurance Engineering in accordance with engineering drawings and specifications.

In-process, final inspection, and test operations are incorporated into manufacturing routings, which are approved and signed by Quality Assurance Engineering in accordance with internal requirements. Need for special inspection tools, fixtures and gages, inclusion of all inspections, and adequacy and completeness of the routing information are considered by Quality Assurance Engineering during their review.

Before an in-process or final inspection operation is performed, reference is made to appropriate document control lists to assure the use of proper revisions of drawings, specifications, and procedures. Measuring and testing equipment is checked before use to assure proper inspection and calibration status by making reference to the calibration sticker. After a manufacturing sequence is inspected, the acceptance of the operation is recorded by inspection on the Inspection Control Card, prior to proceeding to the next operation. Each inspector verifies that all prior operations are listed and signed off on the Inspection Control Card. Upon performing inspection operations as required by the manufacturing routing or other approved internal instruction, inspection is responsible for documenting the inspection utilizing inspection forms, checklists, suitable log book, etc. Prior to functional testing or to shipment of completed parts or components, suitable releases are obtained, as required, from the Quality Assurance Records center.

Nonconforming conditions noted during inspections are documented and processed in accordance with documented procedures. When appropriate, sampling inspection by attributes and/or variables is used. Normally, government sampling references are employed. However, sampling plans may be developed from recognized texts and techniques to suit EMD needs. The sampling and quality level are based on the function of the component and/or characteristics. Records of sampling inspection are maintained on appropriate documentation and filed in the Quality Assurance Records center or in the receiving inspection area per internal instructions.

17.1.10.3 Tampa Division

To provide process and product verification, detailed Inspection Point Programs are generated for each manufactured unit. The Inspection Point Program parallels the manufacturing operation sequence that is prepared by Manufacturing and approved by the Quality Assurance Department. The Quality Assurance engineer reviews the operational lineup for compliance with ASME Code Section III, drawings and applicable Westinghouse specifications. The pertinent inspection points are inserted by the Quality Assurance engineer, who applies inspections at the last accessible, advantageous stage in process, and includes appropriate notification and hold points for witnessing by purchaser and authorized code inspector, respectively.

These points specify the type of inspection, applicable nondestructive examination, data to be recorded and charts or forms to be completed for documentation of inspection operations. As discussed in Section 17.1.3.3, the need for special inspection tools, fixtures and gages is determined during Quality Assurance reviews prior to releasing drawings for manufacture or purchase.

The Inspection Point Programs are distributed to the Quality Control technician in the applicable manufacturing areas for the specific component. The Quality Control technician initials or stamps the inspection points upon completion of inspection, signifying acceptance. The inspector's name and SNT-TC-1A rating is shown on all non-destructive examination reports. All operations within a manufacturing section are detailed and accepted on the Inspection Point Program which serves as the inspection checklist. Quality Control technicians verify the completeness of the Inspection Point Program to assure that all operations are complete within the section. Any deviation from the specified routing

between manufacturing groups requires documentation and Quality Assurance concurrence. The program and its applicable data forms, charts, and logs become a permanent quality control record to provide objective evidence of the inspection operations.

The programs are audited by Quality Assurance personnel, customer representatives and the authorized Code Inspector. Specific mandatory notification points which require witnessing or inspection by the customer representative are established and are so designated in appropriate documents.

17.1.10.4 Pensacola Division

Quality Assurance Engineering maintains an inspection planning program to obtain assurance of the following points:

1. Inspection instructions are clear, concise, and adequately definitive.
2. Inspection operations are referenced and applied at the most effective and advantageous points in the process to monitor product quality.
3. Relatively complex inspection procedures are reviewed with Inspection Supervisors for concurrence with the information reflected.
4. Inspection methods requiring training of personnel are issued prior to production and a training program initiated on a timely basis so that personnel involved will be qualified for production inspection processing.

5. Special tooling, fixturing, and gaging equipment required for product quality evaluation are designed, built, evaluated and released for inspection use.
6. All documentation formats which will report inspection results are prepared and issued.

Required inspections and tests are displayed by the shop routing and inspection instructions referenced. Within Pensacola Division the movement of hardware from cost center to cost center is controlled by means of a routing document. This document is a brief description of the fabrication sequence including inspection operations which are distributed throughout the manufacturing cycle at those points which will verify the quality of the product. Each operation must be signed-off prior to proceeding to the next operation. Documentation is evaluated by the Inspection Department to assure that all operations, inspections and tests have been performed and are acceptable. Objective evidence of the inspection performed is documented by routing sign-off, nondestructive examination reports, and detailed dimensional inspection reports. After manufacture and inspection, major components and assemblies are released by the Inspection Department before utilization on the next assembly.

17.1.10.5 Specialty Metals Division

Quality Control and Inspection provides assurance that processing capability requirements are being met by observation and evaluation of operator's adherence to manufacturing instruction, written procedures, and other control documents. In-process inspection inspects the product at designated, advantageous, stages of manufacture (including first piece and patrol where appropriate) to assure compliance with the intermediate and final product specifications.

Procedures for inspection points are preplanned and are prepared by the Quality Control Engineer in the form of Quality Control Specifications. The need for special inspection tools, fixtures, and gages is considered by both Quality Control and Inspection and Manufacturing Engineering during the development and review of these instructions. These specifications indicate the inspections to be performed during the process so that it can be determined that the product has met specifications. These are reviewed prior to issue by Manufacturing Engineering. Results of inspections are posted on the designated quality form by the inspector. As final inspection operations are completed, the inspector initials the follow card.

17.1.10.6 Nuclear Service Division

Inspection required for NSD equipment used in service operations is the responsibility of the subcontractors who manufacture the equipment. NSD follows the same approach as described in 17.1.10.1 for PWRSD.

As noted under Control of Special Processes, NSD supplies optional pre-service inspection services through the Inservice Inspection Services section of Field Operations. A complete description of this service is afforded by the ISI QA Program Plan which, itself, is a micro-program addressing the 18 criteria of Appendix B 10CFR50 as applicable to the activity.

NSD Product Assurance monitors inspection activities for which the division has direct or indirect responsibility through source surveillance, site audits and in-house audits.

17.1.11 TEST CONTROL

Means are established at each of the Water Reactor Divisions to control testing. These measures provide for the development of procedures, a means of assessing adequacy of the tested items, and designation of the responsibility for performing the various phases of the testing activities.

17.1.11.1 PWR Systems Division

Quality system specifications such as QCS-1 and QCS-2 impose test control requirements on suppliers. These require the supplier to make provision for:

1. Instructions for testing method, and test equipment instrumentation.
2. Test prerequisites which include, but are not limited to, the following:
 - a. Calibrated instrumentation.
 - b. Adequate and appropriate equipment.
 - c. Trained, qualified, and as appropriate, licensed and/or certified personnel.
 - d. Preparation, condition, and completeness of the item to be tested.
 - e. Suitable and, if required, controlled environmental conditions.
 - f. Acceptance and rejection criteria.

g. Methods of documenting or recording test data results.

Recognition of mandatory inspection, notification and hold points, where applicable, for witness by PWRSD or other interested parties, as defined in the procurement order are incorporated either in the suppliers' inspection plan or in the test procedure.

Procurement documents identify technical test requirements and provide for suppliers' test procedure submittal for approval, where appropriate. Tests are conducted by groups within the supplier organization considered acceptable during supplier selection, and test control systems are audited during Quality Assurance surveillance. Also, records of tests are reviewed for acceptability during surveillance, and this review includes consideration of the qualifications of the supplier group who makes acceptance disposition of test results.

17.1.11.2 Electro-Mechanical Division

In order to assure that all testing programs are conducted under adequately controlled conditions, test engineers of the Works Engineering and Test Operation section, in conjunction with design engineers of the same section, prepare test specifications, including the associated acceptance criteria. The test engineers are responsible for the design and procurement of all test facilities, tooling and instrumentation, including the placement of applicable instrumentation on a formal calibration control program.

Personnel assigned to perform testing operations are trained and qualified under a closely supervised program, with specific qualifications and responsibilities identified by position description.

Detailed test instructions are provided for in the form of drawings supporting test procedures and routings into which mandatory owner, contractor, and Authorized Inspector notification/witness points have been incorporated by Quality Assurance Engineering as part of their review function.

Initial application of new test instructions are jointly performed by test engineers and the tester to insure their feasibility and adequacy. Prior to initiation of the testing operation processing information is reviewed to confirm that the subject item is complete and in condition for testing. In addition, environmental conditions are also confirmed as satisfactory for the test.

Test results are documented by the use of formal reporting forms validated by the tester and test engineer, and evaluated by the cognizant design engineer.

As evidence of acceptability a formal test release is issued, signed and approved by the tester, test engineer and design engineer and forwarded to the Quality Assurance Department.

17.1.11.3 Tampa Division

The Quality program provides for assurance that tests are performed according to written procedures and under suitable controlled conditions. Procedures contain instructions for the testing method and include requirements for test equipment instrumentation and its calibration, adequate and appropriate test equipment, trained and qualified personnel, proper preparation and condition of the item to be tested, appropriate notification/ witness points, and methods of documenting test data results. Definitive acceptance criteria are established by Quality

Assurance, so that acceptance status can be clearly shown at the completion of each test. Any nonconformance with the established acceptance criteria is reviewed by Quality Assurance.

17.1.11.4 Pensacola Division

Testing performed at the Pensacola Division is limited at present to hydrostatic testing of a subassembly. Testing is performed by qualified personnel at a predetermined point described on process route sheets, using a detailed test procedure. The test procedure requirements include: Use of calibrated instrumentation; adequate equipment and controlled environmental conditions; inspection notification/hold points for witness by purchaser and authorized code inspector, respectively; and definitive acceptance criteria to clearly establish acceptance status at test completion. Test equipment is calibrated at regular intervals.

Test results are documented by the test technician and objective evidence forwarded to the records section for retention.

17.1.11.5 Specialty Metals Division

One test is applied to product at SMD. For this test, which is an automatic go/no-go test performed by the Manufacturing Group, on-the-job training is utilized. No additional special training is necessary. A documented test procedure is written by Manufacturing Engineering and approved by Quality Control and Inspection. The procedure includes requirements for: use of calibrated instrumentation, audited as part of the regular Quality Control and Inspection gage calibration program; testing at a proper stage of product completion, under proper conditions; provision for applying the test, as required, to all products with clear

go/no-go acceptance criteria, and provision for marking and isolation of any defectives. Notification points for witnessing are not applicable since a continuous process is utilized.

17.1.11.6 Nuclear-Service Division

The role of NSD site personnel during plant preoperational and startup testing is advisory in nature. Guidance documents in the form of test procedures are provided to the applicant describing Westinghouse recommended programs.

For equipment used by NSD in providing services, test control is exercised by documented test procedures and QA witnessing of tests at suppliers' plants on NSD facilities according to NSD approved test procedures. The degree of test control is compatible with the safety related use, and complexity of such equipment.

17.1.12 CONTROL OF MEASURING AND TEST EQUIPMENT

Each of the Water Reactor Divisions maintain a means of controlling measuring and test equipment. Each division has developed and maintains a separate basis for its own program considering such attributes as; inherent stability of their equipment, purpose or use, desired accuracy, and degree of usage. All measuring and test equipment used for the acceptance and verification of product quality are maintained under control systems, which identify the status of all items of measuring and test equipment. Such specifications as Mil-C-45662 and handbook Mil-HDBK- 52 serve as a basis and provide guidance in the determination of an effective program for the control of test and measuring equipment. Typical of this equipment are micrometers, plug gages, height gages,

dial calipers, voltmeters, temperature recorders, pressure gages, hardness testers, etc. Documented procedures detail the requirements for the calibration of measuring and test equipment and the use of appropriately traceable measurement standards.

17.1.12.1 PWR Systems Division

The requirement for a supplier to maintain a system for calibration of examination, measuring and test equipment is contained in QCS-1 and QCS-2. Measuring and test equipment must be uniquely identified; calibration must be traceable to national standards, or the alternative basis for calibration shall be documented. An investigation will be conducted and documented to determine the validity of previous inspections performed when measuring and test equipment is found to be out of calibration. PWRSD verifies the acceptability of the system during supplier selection and monitors for compliance during surveillance activities.

17.1.12.2 Electro-Mechanical Division

EMD under the direction of the Quality Assurance Department, maintains an extensive tool and gage control program utilizing electronic data processing. All tools and gages used in the manufacture and inspection of completed products are inspected and calibrated in accordance with established procedure. Control of the use of measuring and test equipment is maintained by the tool crib approach where equipment is logged out to individuals or assigned to specific areas. The program requires that any equipment which becomes damaged or out of calibration shall be forwarded for repair or recalibration, as required. Under this program, precision tools and gages are inspected and calibrated at specified intervals based on their stability, purpose and degree of usage. All

tool and gage inspection and calibration is performed in a controlled environment. Calibration stickers are affixed to all equipment, excluding personal tools, which have been found acceptable under the program. Personal tools are identified by name with the calibration status maintained by the gage inspector. Reference standards used are certified and traceable to the National Bureau of Standards.

17.1.12.3 Tampa Division

Formalized procedures defining calibration frequency and maintenance of gages and test equipment used for inspections are in effect and implemented by the QA/NDE Department. Quality control tools and gages are identified by Quality Control serial numbers color coded to indicate calibration status, and controlled by a tool crib-card index system. Established calibration schedules for each type of tool or gage used for inspection purposes are used. Frequency of calibration is based on engineering judgement and verified by Quality Control and NDE review of calibration records. Damaged or inaccurate measuring and test equipment is removed from the cycle until repaired, recalibrated or replaced. Master measuring standards are maintained and calibrated on a frequency cycle by a qualified laboratory with standards traceable to the National Bureau of Standards.

Electrical test equipment such as magnetic particle equipment is on a scheduled calibration cycle; the Works Engineering Department is responsible for maintenance and calibration. This effort is audited by Quality Assurance.

Pressure test gages used for hydrostatic and gas leak tests are checked and calibrated on a frequency schedule; dead weight test equipment is used to verify calibration. The procedures are designed to assure

accuracies within established standards and include disposition and/or corrective measures when discrepancies are noted.

17.1.12.4 Pensacola Division

All decisions on the acceptance of any product or quality characteristic are made by utilizing inspection and test equipment which is under calibration by Quality Assurance Department; this calibration is traceable to the National Bureau of Standards. Each gage is identified with a unique identifying serial number. For each individual gage there is established a gage inspection record card which is utilized to record the results of periodic inspections.

Calibration frequencies are initially established by an engineered estimate of the total useful life of the gage and the frequency of re-calibration at one-fifth of this estimated time.

Calibration frequencies are adjusted based on an evaluation comparison of the gage useage versus the wear recorded on the gage inspection record card. Any gage which passes through three calibration cycles without being used is placed in an inactive status until needed at future time.

All gaging and testing equipment is tagged with a sticky label which identifies the date calibrated, the date of next calibration and an identifying stamp of the gage inspector who performed the calibration. Calibration control is maintained by advancing gage calibration record card in a pigeon-hole filing system where each pigeon-hole represents one Work Week within the fifty-two Work Week Year. Gage Record Cards which appear in the current Work Week slot are calibrated within the current Work Week.

The area supervisor, whether manufacturing or inspection, has the responsibility to promptly report any gage in his area known to be functioning improperly. Defective equipment is red-tagged and scheduled for repair or replacement. In the event a gage is discovered which is not within calibration, the gage is immediately taken out of use to permit calibration, repair or scrap of the gage, as applicable. Any item(s) inspected using the discrepant gage is/are re-inspected using a gage known to be in calibration. The Inspection Supervisor has the responsibility to investigate the usage of damaged or out-of-calibration gages and re-inspect all item(s) that previously were inspected using the gage.

17.1.12.5 Specialty Metals Division

Measuring instruments, gages, fixtures, standards, masters, and any item needed to facilitate precise measurement are under the jurisdiction of the Quality Control and Inspection Department.

Quality Control and Inspection is responsible for the control of gaging equipment used by both quality control and manufacturing personnel. Quality Control and Inspection checks and maintains all gages and fixtures assigned to the quality control groups for use in accepting products. The gage calibration lab is under the supervision of Quality Control and Inspection and has written procedures requiring that status of calibration be maintained on all gages and the periodic recall, inspection, and calibration of gages. When calibration is complete, proper notation is made on each gage or instrument in addition to recording calibration results on the Tool Inspection Master Card. Calibration frequencies established by Quality Control and Inspection based on experience are verified periodically by a review of the Tool Inspection Master Card.

17.1.12.6 Nuclear Service Division

Control of measuring and test equipment for NSD supplied equipment is imposed upon suppliers through procurement documents and monitored by QA surveillance.

Within NSD, the responsibility for the control of Westinghouse owned measuring and test equipment is placed upon the various departments that furnish (e.g. start-up services) or use (e.g. inservice inspection) the equipment. Division policies require that procedures for calibration systems are maintained by the individual departments. NSD personnel responsible for supervision or accomplishment of measuring and test activities at site operations are required to verify performance with properly calibrated equipment. NSD Product Assurance audits the adequacy of and conformance to the procedures.

17.1.13 HANDLING, STORAGE AND SHIPPING

Measures to establish control over handling, storage and shipping are in documented procedures in use at each of the Water Reactor Divisions.

17.1.13.1 PWR Systems Division

Since PWRSD does not manufacture equipment, emphasis is placed on controlling the supplier's handling, storage and packaging activities. Procurement documents specify that the supplier's Quality Program require the use of handling procedures and handling equipment inspection procedures to prevent damage to the equipment. The supplier must have adequate written work and inspection instructions for storage, preservation, and packaging for shipment to protect the products from damage, loss, deterioration or substitution. As required by the equipment specification, these procedures may be subject to approval by PWRSD.

The Purchases and Traffic Department administers the transportation of major NSSS components from supplier's facilities and WRD manufacturing facilities, which includes responsibility for assuring that material and equipment is protected against the hazards of mechanical damage and weather during the shipping.

A supplier's procedures and systems for handling, storage, packaging and preparation for shipment are evaluated during source selection and monitored for compliance during PWRSD Quality Assurance Surveillance.

17.1.13.2 Electro-Mechanical Division

EMD has established procedures defining a system of inspection and usage control for all lifting fixtures and devices used in the factory in accordance with existing specifications and applicable industrial safety standards. In addition, a review committee has the responsibility to review lifting and handling fixtures and equipment, and to arrange for marking of their identification and limits, and to determine necessary corrective action when non-compliance to a required standard is found.

In-process movement and storage of material, components, sub-assemblies and assemblies is defined by manufacturing procedures that provide the instructions necessary to maintain identity and protect finished attributes and surfaces from damage.

Packaging and shipping requirements required by contract are reviewed and appropriate manufacturing routing prepared. Specific packaging instructions are referenced within the manufacturing routing including pertinent inspections to assure that preservation, packaging and packing is accomplished to protect the products and/or supplies from damage, loss, deterioration, degradation or substitution.

17.1.13.3 Tampa Division

Established procedures and training are provided for materials handling personnel. A procedure book on safe practices in rigging and crane operation, including sketches and handling methods for all major production lifts, is supplied to the riggers and crane operators.

The guidelines set forth in the procedure book are established by the Tampa Division Lifting Committee and includes requirements for inspection of chain slings, wire rope slings, shackles, eye bolts, plate clamps and hoisting ropes. In addition to visual examination, all hooks are periodically nondestructively examined.

Protective covers are used on nozzles after final machining to protect weld preparations, preserve cleanliness and minimize damage.

Shipping drawings are prepared to detail arrangement for barge or car shipments, cradles to be used, size and number of tie down straps and rods. In conjunction with the drawing, a formal procedure is issued that specifies appropriate requirements such as strap and tie down locations, welding to be performed, and special reinforcement.

17.1.13.4 Pensacola Division

Handling, storing and shipping methods are defined by written procedures. Quality Assurance Engineering reviews all procedures, makes recommendations for improvements, and audits the procedures for compliance. Special frames, jigs, and containers are used for in-process handling and storage to protect the dimensional and finish attributes of component parts.

17.1.13.5 Specialty Metals Division

Facilities are available and procedures are written for crating, packaging, preserving and identifying products for shipment in accordance with various commercial and federal specifications.

The material is handled and stored according to procedures which describe the manner of storage, protection of finishes, and control of limited life supplies. Quality Control and Inspection conducts periodic audits of storage areas to assure conformance to applicable storage procedures and requirements.

17.1.13.6 Nuclear Service Division

Handling, storage and shipping requirements are specified in equipment specifications or procurement documents for NSD equipment manufactured under subcontract. Where necessary, supplier procedures are requested for NSD review and approval. QA surveillance assures conformance at supplier plants.

Component handling equipment is supplied by NSD for major components of the NSSS such as steam generators and reactor vessels. The design, procurement and maintenance of the fixtures required for this service are prescribed by written procedures with significant control features monitored and audited by NSD Product Assurance.

PWRSD supplies criteria for shipping, handling and storage of NSSS equipment. NSD assures that the specified criteria are complied with at construction sites.

17.1.14 INSPECTION, TEST AND OPERATING STATUS

Each of the Water Reactor Divisions has established procedures to indicate the inspection, test and operating status of materials, parts and components. A major purpose of these procedures is to preclude inadvertent bypassing of inspections and tests.

17.1.14.1 PWR Systems Division

Quality system specifications such as QCS-1 and QCS-2 contain requirements that a supplier have measures to indicate the inspection, test, and operating status of an item, and that nonconforming items are clearly identified to prevent inadvertent use. The supplier is required to control usage of inspection and welding stamps or other status indicators, including declared authority for application and removal of tags, marking labels, and stamps. The procedures used to establish these measures and the application of the procedures are reviewed for adequacy during supplier selection and monitored for compliance during the surveillance activities.

17.1.14.2 Electro-Mechanical Division

The positive identification of inspection status for each product is accomplished by the Inspection Control Card (ICC) which travels with the product from one manufacturing section to the next. The quality control inspection stamps on the ICC indicate acceptance of the product at specific checkpoints integral to the manufacturing routing with assigned operation numbers. The inspection stamp system maintains control of each stamp symbol and the individual to whom it is issued.

17.1.14.3 Tampa Division

Procedures are used to maintain identity of all material and manufactured components, beginning with receipt inspection through final shipment of the product. Material is identified by use of Tampa test number as described in Section 17.1.8. Test numbers are not changed when material is transferred to another order. These numbers are recorded in the applicable inspection point program. The required test reports can be identified by the master test number log.

The inspection point program readily identifies the completed manufacturing operations as well as the completed inspection and/or nondestructive examinations. Also, Production Planning of the Manufacturing Department keeps an up to date status report on each component for all orders.

Nonconforming material is identified by use of tags as described in the Error Appraisal Notice procedure (see Section 17.1.15). The inspection documents identify the technician that performed the inspection or test; the individual qualifications are in accordance with SNT-TC-1A as required by the ASME Code, Section III.

17.1.14.4 Pensacola Division

All manufactured material is identified by a route sheet throughout the manufacturing operation. The route sheet is stamped at all inspection, NDE and manufacturing steps. If an item is discrepant, the number of the rejection document is entered on the route sheet. Therefore, the status of each item is always available. Control of stamp issuance and use is maintained by Quality Assurance Records of the Inspection Department.

17.1.14.5 Specialty Metal Division

A record system is followed to identify the stage of manufacture of a product at SMD. Manufacturing instructions indicate inspection and test points in the sequence of operations. An identifying number is applied to the material as it enters the plant. This number is modified as the material is processed; however, the basic number is used for identification. Process Follow Cards identify the status of the manufacturing operations as well as inspection and test status.

Non-conforming materials are identified and held for disposition. Actions taken are documented and become part of the records and data system.

17.1.14.6 Nuclear Service Division

NSD procurement documents for equipment used in NSD services specify that suppliers must establish procedures to indicate the inspection, test and operating status of items being supplied. The suppliers' procedures and implementation are reviewed for adequacy during supplier selection and are monitored for compliance during the surveillance activities.

Status of preservice inspection activities at plant sites is maintained through document check offs.

Inspection, test and operating status of equipment used in preoperational activities is maintained by NSD in accordance with written procedures.

17.1.15 NONCONFORMING MATERIAL, PARTS OR COMPONENTS

Each of the Water Reactor Divisions has documented procedures to control nonconforming material, parts and components which prevent their inadvertent use and provide for their identification, segregation and disposition. Normally each of the Water Reactor Divisions makes disposition of those nonconforming material reports which vary from specifications and standards established within the division. Where in-process nonconforming items are submitted for inspection, rejected, and repaired to attain full compliance with design specification requirements, notation of the repair and re-inspection is contained within the inspection records. Nonconformances of technical requirements contained or referenced within procurement documents are controlled by PWRSD. If a deviation from these requirements affects an interface with other nuclear power plant equipment (e.g., dimensional deviation of mounting points, location of nozzles, etc.) the cognizant engineer is responsible for notifying the applicant of the discrepancy prior to the time of shipment of the equipment. Documentation uniquely identifies the non-conforming item to assure documentation-to-equipment traceability, describes the nonconformance, the disposition of the nonconformance, and includes signature approval of the disposition. Nonconformance to technical requirements of procurement documents are approved by PWRSD, identified on the final quality release, and transmitted to the applicant as part of the data package.

In the course of the review and evaluation process, Westinghouse assesses deficiencies and determines which may be classed in the categories of significant deficiencies, unreviewed safety questions, or substantial safety hazards. A standing committee has been formed to review deficiencies so categorized on a timely basis, to identify those that are significant, and to provide the required notification.

The determination of whether a condition adverse or potentially adverse to safety should be identified as a significant deficiency or unreviewed safety question is based upon a review relative to the criteria implicit in the definitions from sections 10CFR50.55(e) and 10CFR50.59 of the NRC regulations. The review includes a determination of whether a nonconformance detected and corrected or repaired in an affected plant could be present but undetected in other plants or systems employing similar components or equipment.

The determination of whether a noncompliance or defect is sufficiently important to be identified as a substantial safety hazard is based upon a review relative to the criteria defined in Section 20.6 of the Energy Reorganization Act of 1974.

17.1.15.1 PWR Systems Division

The Administrative Specification, QCS-1 and QCS-2, contain specific contractual requirements for controlling nonconforming material or workmanship.

Suppliers are required to provide a system for the identification, documentation and evaluation of discrepancies, for reviewing for trends, and for alerting the supplier's cognizant management to the need for corrective action. A Westinghouse deviation form is initiated by the supplier and completed per instructions on the back of the form. Upon receipt at PWR the deviation is processed in accordance with documented instructions to assure proper review and disposition by both Engineering and Product Assurance with concurrence of Mechanics and Materials and/or System Engineering as appropriate. Possible dispositions are, Accept, Repair, Scrap, and Resubmit. When repair is indicated, acceptance of the repaired item upon completion of the repair is noted

by the supplier's signature on the deviation form. The acceptability of repaired or reworked parts, components or equipment is verified by reinspecting as originally performed, or by a method which is at least equal to the original inspection method.

Deviation Notices which describe nonconformances to technical procurement requirements, including those which are dispositioned for use unchanged, and those dispositioned for repair are referenced on and attached to the Quality Release, and forwarded with the equipment shipment. A permanent file of the deviation records is maintained by PWRSD.

Deviation Notices from PWRSD suppliers and other Water Reactor Manufacturing Divisions which supply NSSS equipment are collated, summarized, and analyzed to aid in the detection of quality trends and areas where corrective action is required, as further described in section 17.1.16.

17.1.15.2 Electro-Mechanical Division

Non-conforming material is identified and controlled until disposition is received. All deviations are reviewed and disposition made by engineering personnel. The Non-conforming Material Control and Evaluation Program provides for review and evaluation of cause and corrective action to prevent recurrence.

Data concerning non-conforming material is categorized to type of deviation and component. Appropriate reports are formulated under the program for evaluation and management action toward reduction in costly defectives and towards quality improvement.

EMD utilizes a multi-copy Material Review Report (MRR) with non-repetitive sequential numbers. In addition, EMD utilizes electronic data processing to summarize Material Review Report by order, part, serial or lot number. This summary provides convenient quality history trace-back.

The MRR system provides:

1. Identification of non-conforming material and its status.
2. Segregation of non-conforming material from production material by physical means where possible or otherwise by positive identification.
3. Formal disposition of the non-conforming material from Engineering and Quality Assurance Engineering.
4. Verification of rework or repair to correct the non-conforming material by inspection personnel in the form of a stamp or authorized signature on appropriate documentation.
5. Further, the system provides for correction of the causes of non-conforming material to prevent recurrence during all phases of procurement and fabrication.

17.1.15.3 Tampa Division

Materials, parts or components which do not meet design drawings or specifications, process specifications or quality standards are considered defective material. All deviations are documented by the Error Appraisal Notice (EAN) system. An EAN is issued upon discovery of

nonconforming or defective work produced by any department and a caution tag is attached to the material signifying a discrepant condition. Upon issuance of an EAN by the Quality Control or NDE Technicians, the Quality Assurance Engineer verifies the technician's findings. The Quality Assurance or Manufacturing Engineer recommends corrective repair when applicable. Where appropriate repair procedures are incorporated within approved welding or manufacturing procedures, these are specified and the EAN is completed by Quality Assurance. EAN's are transmitted to Metallurgical Engineering for all discrepancies that involve welding and related functions such as heat treatment, pre-heat, etc.; and/or Engineering for all other conditions. Engineering or Metallurgical Engineering either agrees with the recommended repair, or issues further instructions. The answered EAN is returned to Quality Assurance who then initiates an attachment that details the manufacturing operations and inspections required to conform to the specified Engineering instructions. The EAN with attachment is distributed to Manufacturing, Manufacturing Groups, QC/NDE and other departments that are involved. Upon completion of the repair the EAN attachment is signed off by the Quality Control technician and is added to the inspection records for that particular component or part and the caution tag is removed from the piece by the Quality Control technician. The system provides identification of discrepant material, a formal notification to individuals involved and the formal signature signifying repair and acceptance of the material. In the event that material or parts are not repairable and are to be scrapped, the piece is removed from the manufacturing area to prevent inadvertent use.

17.1.15.4 Pensacola Division

Pensacola Division maintains systematic control of the identification, segregation, and disposition of all nonconforming materials, components,

subassemblies, and equipment. A specific form is assigned for each type of rejection that could occur in the processing of all material and subsequently fabricated product. These forms provide for the specific delineation of existing conditions resulting in a "reject" disposition.

The issuance, processing, and dispositioning of this documentation is under control of the Quality Assurance Department. When the determination is made that a discrepancy exists, the material or product involved is immediately tagged and segregated, if feasible, until disposition is made on the governing document.

Disposition of nonconforming material is defined by formal procedures. All dispositions must be approved by the pertinent quality engineer before any rework, repair, scrap, or vendor return action is taken. All dispositions are formally documented, and files kept for future reference and management evaluation.

The Inspection Department is responsible for performing the routed inspection operations and tests, signing off the rework/repair routing and preparing required non-destructive examination reports and detailed dimensional reports.

17.1.15.5 Specialty Metals Division

A formal procedure is used in identifying and controlling all defective material detected at receiving, in any stage of processing or at final inspection. It is the responsibility of the Quality Control and Inspection Department to identify any production material that varies from contract, drawings, specifications, procedures, process, or

quality standards. Quality Control and Inspection then informs the proper personnel, determines or obtains disposition, approves and signs off the corrections or modifications, maintains records of the occurrence, and assures that fundamental corrective action is taken.

Deviations from product or process contractual requirements are reported to NFD or Tampa in accordance with their instructions for their disposition.

17.1.15.6 Nuclear Service Division

Nonconformances discovered at NSD supplier plants are controlled by use of the same Deviation Notice System which is described in 17.1.15.1. Disposition is provided by NSD Technical Operations.

A written procedure describes the system for identifying, reporting and obtaining disposition of nonconforming NSSS material or equipment discovered at the construction site. NSD personnel fill out a Field Deficiency Report (FDR) to provide the cognizant PWRSD engineering group with the information necessary for making proper and timely disposition of each problem. Those reports which involve work on safety-related equipment are reviewed and concurred in by PWRSD Product Assurance for the purpose of reviewing quality requirements applied to the repair operations. After the cognizant personnel make a disposition, it is noted on the FDR and returned to the field for action. A file for each FDR is maintained in the field containing documents necessary to complete the disposition or necessary modification or repair; included, as appropriate, are telexes, memoranda, telecon messages, letters, procedures, instructions and shipping notices. Verification of the deficiency correction is performed by Westinghouse site personnel. PWRSD Engineering maintains files to record all field deficiencies and to provide for long-term corrective action.

17.1.16 CORRECTIVE ACTION

Each of the Water Reactor Divisions has a corrective action program which has a means for determining the need for corrective action, documenting the need and the action taken, follow-up on the action for effectiveness, and reporting the need and action taken to appropriate management personnel.

17.1.16.1 PWR Systems Division

Quality System specifications such as QCS-1 and QCS-2 require that the supplier's quality system provide for the identification and evaluation of significant or recurring discrepancies and for alerting the supplier's cognizant management of the need for corrective action. The supplier must review corrective action for effectiveness and the need for further action. The suppliers corrective action program is reviewed for adequacy during supplier selection and monitored for compliance during the surveillance activities.

Product Assurance receives and reviews nonconformance documents. The deficiency data received from suppliers (Deviation Notices) and from construction sites (Field Deficiency Reports) is analyzed to determine patterns of occurrence by supplier, by NSSS component, or by process. With this as a guide, Product Assurance and cognizant engineers determine corrective actions that are needed to prevent recurrence. This action is in addition to assuring that the supplier or site personnel apply corrective action to the individual deficiencies reported.

Follow-up of corrective actions is made to verify effective correction of root causes of discrepancies. Through periodic reports, management is informed of the need for action, and the action taken. Several of the reports are: Trip reports, Field Deficiency Report Summaries,

Audit reports, and Monthly Operations Status reports. On internal PWRSD matters, corrective action is applied to corroborated findings of internal, customer or NRC audits, and to systems problems recognized by other means. These needed corrective actions, once identified, are documented and tracked to resolution by Product Assurance.

17.1.16.2 Electro-Mechanical Division

EMD's Quality Program provides, through a computer system, for the early detection of non-conforming material, summarization of recurring or significant quality problems, analysis of trends, and diagnosis of causes. Appropriate levels of management are notified of significant failures, malfunctions, and non-conformances. The corrective action program covers vendor quality performance, in-plant operations and field installation problems.

17.1.16.3 Tampa Division

The Quality Assurance Engineer is responsible for reviewing all Error Appraisal Notices and other data relating to the quality of products and operations under his cognizance. As a result of this review, the Engineer is responsible for initiating positive corrective action when a quality problem of significant magnitude is indicated on the basis of safety, cost or possibility of shipping undetected discrepancies and recurring discrepancies indicate a need for correction of design, process or method.

Systems have been established to identify and document trends in specific operations such as tube welding, inspection and test and also all major pressure welds. Reports are issued to cognizant management personnel for action when deemed necessary.

17.1.16.4 Pensacola Division

The cause of deficiencies and action taken by the responsible group to prevent the recurrence of discrepancies are documented. Recurring deficiencies are tabulated by a computer program and analyzed by cognizant supervisory, engineering, and management personnel. Positive corrective action is taken to prevent recurrence.

A quality costs program permits computer tabulation of specific quality costs, so that problem areas may be readily identified, investigated and corrected.

17.1.16.5 Specialty Metals Division

Formal procedures require the documented reporting of all material and manufacturing deficiencies. The documentation includes a complete description of the deficiencies, the specification or requirement involved and the disposition. These conditions require formal review by appropriate levels of management. Non conformances to procurement order design requirements are submitted to Tampa or NFD for approval; nonconformance reports are traceable to lot or heat numbers.

Recurring deficiencies are analyzed by Quality Control and Inspection and cognizant engineers for corrective action taken to prevent recurrence. The recommended action requires the review and approval of responsible Manufacturing, Manufacturing Engineering, and Quality Control and Inspection managers. In addition to corrective action covering deficiencies, standard statistical evaluations are performed on current manufacturing data to determine manufacturing trends and to prevent the manufacture of defective material.

A Quality Costs Program is in effect which identifies problem areas. Teams are established to investigate the causes and see that corrective action is put in place.

17.1.16.6 Nuclear Service Division

In addition to the immediate actions prescribed as dispositions to non-conformances, NSD maintains an ongoing corrective action program to preclude recurrence of significant problems. Product Assurance is responsible for identifying areas requiring corrective action based on evaluation of problems such as nonconformances, failures, malfunctions, and other deviations from requirements in the NSD scope of work. Problems are identified by activities such as audits, inspection and surveillance. Corrective action decisions, where at all possible, are based upon determining of the underlying problem causes.

The corrective action program is described by written procedures and contains the following elements:

Description of the problem, including cause, if known

Recommended corrective action

Assignment of responsibility for corrective action

Responses by management of organization responsible for corrective action

Follow up evaluation of effectiveness of corrective action

Monthly reports to management summarizing the status of problems and corrective actions

NSD also identifies site construction problems to PWRSD for corrective actions on PWRSD supplied equipment.

17.1.17 QUALITY ASSURANCE RECORDS

The WRD Quality Assurance Program includes the retention of those fabrication, inspection and surveillance records essential to demonstrating product quality. Records are reviewed by Westinghouse quality assurance personnel, microfilmed and submitted, if required by contract, to the applicant prior to plant acceptance. Records relating to the design and fabrication of NSSS equipment are available for review.

Westinghouse policies and procedures for accumulation, use and retention of quality assurance records follow the guidance of ANSI N45.2.9 -1974 Requirements for Collection, Storage, and Maintenance of Quality Assurance Records for Nuclear Power Plants for safety-related equipment. An acceptable alternative to the protective construction features of permanent storage facilities is utilized, where a duplicate set of records is maintained in separate geographical locations, as at the point of origin, at PWRSD, or at Westinghouse Records Center. This occurs especially where PWRSD maintains a microfilm file of duplicate records. The duplicate records afford advantages in communication between work locations, and other data gathering and problem solving functions, as well as excellent protection against records loss, which potentially may occur where only original records exist. The records control methods Westinghouse uses, as applied to each tier of supply, are described in Tables 17-3, 17-4, and throughout this section.

17.1.17.1 PWR Systems Division

Records affecting quality such as Engineering Department design and analyses, Purchasing procurement documents, Product Assurance audits,

Nuclear Safety Department studies and analyses and Quality Assurance supplier surveillance reports are maintained by PWRSD.

Internal documents QCS-1, QCS-2, Administrative Specification and equipment specifications provide documentation requirements to suppliers defining the content of quality assurance records, and requirements for maintenance, transmittal and retention. These records include suppliers design records, material test reports, personnel qualifications, non-destructive examination, inspection, and test records. Suppliers are required to maintain these records for periods specified by procurement documents, after which they must notify PWRSD for disposition.

Records such as trip reports, deviation notices, and other quality-related documents form a part of the records maintained by PWRSD. These combined supplier and PWRSD quality assurance records comprise the supporting documentation which will be maintained for the life of the plant.

Table 17-3 is a listing of the documents and records kept as a part of the NSSS program. Key elements to provide document identification and retrievability are the regular use of SPIN, shop order and purchase order numbers. Item 8d shows both the supplier and WRD having a retention responsibility. The supplier retains all data relative to the component, and PWRSD obtains copies of specific significant data to maintain as a part of the history file. Table 17-4 lists some typical components and details the data retained for each.

Records generated at the construction site are filed and maintained there.

17.1.17.2 Electro-Mechanical Division

EMD maintains sufficient product related records to furnish documentary evidence of activities affecting quality. The documentation and data

requirements are determined during the initial quality planning stage for each contract and appropriate instructions and documentation check lists are prepared for internal records audits to assure that required records are generated. Records include results of technical and divisional reviews, inspections, audits, material analyses, data on work performance, operating logs and test results. Closely related data such as qualifications of personnel, procedures, and equipment are also retained.

Retention is determined by the respective department which conducts the review, test, qualification, etc. Records affecting quality, including those maintained by other departments, are subject to quality assurance audit.

17.1.17.3 Tampa Division

Established quality assurance systems provide measures to assure that quality operations necessary to verify compliance to applicable codes and contracts have been satisfactorily performed, accepted and documented. Records are accumulated for inspection operations performed by Quality Control during the manufacturing cycle including Inspection Point Programs signifying required inspections, weld logs identifying qualified material and welders, material certifications and test results, major material test number traceability listings to component shop order numbers, certificates of test and discrepancy resolution documentation. Documentation is identified to and filed by component shop order number in the Quality Assurance Department. Records are periodically audited by Quality Control Records Technicians during the manufacturing cycle. Upon completion of a part, subassembly or component, the records are reviewed and approved by the Records Technicians in their entirety for completeness and correctness. Upon approval of records, Quality Assurance Engineering prepares and issues a quality release identifying that all quality

standard requirements have been completed and approved, thus signifying that component is released for shipment. Records are shipped to Westinghouse Records Center for microfilming. The positive is retained at the Center and the negative is retained by Westinghouse for the life of the component.

17.1.17.4 Pensacola Division

A records system is maintained by Quality Assurance to furnish documentary evidence of results affecting quality. This system includes, but is not limited to, logging and filing of material certifications, inspection results, discrepancy documentation, test results, audit results, and other closely related data such as qualification of personnel, procedures and equipment.

Pensacola Division maintains a comprehensive records system designed to accumulate, evaluate and retain permanent and non-permanent documents in accordance with ASME code and ANSI standards.

All documentation is forwarded to the Quality Assurance Records Section of the Inspection Department upon completion of manufacturing or inspection operations. The Records Section has receipt control of all records received and only authorized personnel are permitted access to the files.

Quality status checklists are maintained by the Records Section for all major items. Records for other items involves a relatively short process time span and thus do not require status checklists.

After shipment of a shop order, pertinent records are placed on microfilm within 30 days. One copy of the microfilm remains at Pensacola Division for reference purposes and one copy, along with radiographic film is forwarded to the Westinghouse central storage facility.

17.1.17.5 Specialty Metals Division

Objective evidence and records of the various inspection operations are maintained in the Quality Control and Inspection files. Records related to source or receiving inspection are accumulated in the Quality Control and Inspection files. A permanent record of the results of calibration and checking of gages is maintained in the Quality Control and Inspection files in line with the established Gage Control Procedure. A written records retention system is in effect for appropriate special process, Quality Control and Inspection and Quality Services records.

17.1.17.6 Nuclear Service Division

Written procedures ensure that adequate quality assurance records are prepared and maintained for quality functions within the NSD scope of activity. Suppliers are required through procurement documents to administer records systems that control generation, traceability to items, and maintenance of records essential to demonstrating product quality. NSD adheres essentially to Table 17-3 with regard to supplier and in-house record retention.

NSD generated site records in connection with the FDR system are retained by the NSD Central File under the direction of the Technical Operations Department.

Additional records on internal and external audits and personnel qualifications are retained by Product Assurance.

17.1.18 AUDITS

To verify the effectiveness of the Quality Assurance Program, the Water Reactor Divisions apply a comprehensive system of planned and scheduled audits. The audit program includes:

1. Audits of the Water Reactor Divisions performed by the Westinghouse Corporate Headquarters QA Staff.
2. Audits of the Water Reactor Divisions performed by the NES QA Committee.
3. Audits of Water Reactor Divisions performed by other Water Reactor Divisions for intra-WRD purchases.
4. Audits of suppliers performed by Water Reactor Divisions.
5. Audits of Westinghouse site activities performed by the Nuclear Service Division.
6. Internal audits performed by each of the Water Reactor Divisions.

Quality assurance audits are conducted in accordance with defined audit procedures by trained personnel who do not have direct responsibilities in the area being audited. As required by these procedures, checklists are utilized. As a minimum, a documented audit report detailing discrepant areas with needs for corrective measures is issued and reviewed with management having responsibility in the area audited. The originator of an audit report or a designated alternate is required to follow an open item until action is taken to satisfy an audit action item. Records of actions taken to achieve resolution are maintained. Follow-up actions are taken to verify corrective action is effective. Areas subject to audit include all procedures and operations within each of the divisions which affect or have an active part in the total Quality Program as defined by 10CFR50 Appendix B. These include work areas; fabrication, testing and inspection activities; design control activities; procurement activities; processes; product items; process tests and

inspection equipment; personnel qualification; and quality assurance records. Checklists are used to assure that audits appropriately encompass these areas. The schedule and sequence of operations to be audited is planned in advance. For example, the PWRSD audits of Water Reactor Divisions furnishing equipment to PWRSD are established on a calendar year basis by mutual agreement between PWRSD and the particular division. The calendar year schedule identifies the operations to be audited.

Internal audit documentation is open to applicants on request. Such access is provided to appropriate internal audit content following acceptance of normal proprietary information safeguard arrangements.

Should significant deficiencies be encountered (Reference 10CFR50.55.(e)) during an internal audit, such information would be provided to the applicant as indicated in Section 17.1.15.

Westinghouse policies and procedures for auditing follow the guidance of ANSI N45.2.12 (Draft 3, Revision 4, February 22, 1974), Requirements for Auditing of Quality Assurance Programs for Nuclear Power Plants, for safety-related equipment. The auditing programs Westinghouse applies, as appropriate to each tier of supply, are described in Tables 17-1, 17-2 and throughout this section. These methods include such activities as audit planning, performance, reporting and follow-up actions.

17.1.18.1 Westinghouse Corporate Audits

The Westinghouse Corporate Headquarters Quality Assurance Staff has a formal audit program which applies to all divisions of Westinghouse, including divisions furnishing equipment or services to the nuclear industry.

The Westinghouse Corporate Quality Assurance Staff is appointed by the Vice President of Production Resources who reports to the Vice Chairman. The Vice Chairman reports to the Chairman of the Board, who is the Chief Executive Officer. In addition to the auditing function, the staff maintains quality-related training services and provides planning and advisory services for the quality programs throughout Westinghouse. Quality program recommendations are broadly based, considering fundamental aspects of quality assurance upon which individual divisions can construct programs suited to their individual products and customer needs.

The purpose of the audits performed by the Corporate Quality Assurance Staff, is to provide an independent assessment of the division's quality program.

The Corporate Staff evaluates whether or not the division is producing a product which complies with the requirements of their customers and is using effective methods for assuring the manufacture of quality products.

Audits are performed of each division's quality assurance effort by a two-to-four man team, consisting of the team leader from the Headquarters Quality Assurance Staff and the remaining members from the NES Quality Assurance Committee, excluding the quality assurance manager of the division being audited. The audit normally takes five days. The Corporate Headquarters audit of each Westinghouse division is held on the average of once each four years.

The quality assurance systems and procedures that have been established by the division are reviewed to determine if these systems and procedures are sufficient to provide an effective program. Observations are then

made to assure that the established systems and procedures are being correctly followed.

An oral presentation of the findings and conclusions of the audit is made to the Division General Manager, Quality Assurance Manager, and other personnel affected by the audit findings. The items recommended for improvement in the quality assurance program are presented as well as recommendations of approaches for accomplishing these improvements.

Following the audit, a written report containing the findings and recommendations reviewed in the oral report is prepared and sent to the responsible division personnel. In addition, a copy of the report is sent to the WRD Vice President and General Manager and to appropriate Headquarters personnel.

17.1.18.2 NES Quality Assurance Committee Audits

The Westinghouse Nuclear Energy Systems Quality Assurance Committee has established an audit program which applies to the Westinghouse divisions engaged in nuclear steam supply system design or manufacture of pressurized water reactor equipment. The purpose of the audits is to provide in-depth evaluation of the quality assurance policies and processes of the various Westinghouse Water Reactor Divisions in order to verify that they result in products and services which meet safety and reliability requirements. Particular emphasis during the audit of the quality assurance programs is placed on compliance with the requirements of 10CFR50, Appendix B.

In addition to carrying out audits, the committee serves as a forum to communicate quality and reliability activities, and to establish improved and consistent division policies of quality assurance in light of nuclear industry requirements.

Annual quality assurance system audits are conducted of each Westinghouse Water Reactor Division by an audit team composed of representatives from the Committee. However, the Quality Assurance Manager from the division being audited is not a member of the audit team.

Typical team membership is three men. Each audit normally takes three days. The Corporate Headquarters audits, described above, of Westinghouse Water Reactor Divisions substitutes for the annual Westinghouse NES QA Committee audit the year it is held.

At the conclusion of each audit an oral presentation is made by the audit team to the division General Manager and Quality Assurance Manager of the division which has been audited.

Following the audit, a written report containing the findings of the audit including recommendations for improvement in the quality assurance program and its implementation is sent to the responsible division personnel, to the committee members, to the Westinghouse WRD Vice President and General Manager, and to the Executive Assistant to the NES Vice President. This procedure provides high level management attention to actions needed to carry out recommendations of the audit. Audit data are reviewed to detect quality trends over a span of several audits. The trends indicated and a review of the quality assurance program effectiveness are reported to management.

17.1.18.3 PWR Systems Division

17.1.18.3.1 Suppliers and Water Reactor Manufacturing Divisions

The Westinghouse PWR Systems Divisions audit function of suppliers is described in Section 17.1.7, Control of Purchased Material, Equipment

and Services. The Water Reactor Divisions which supply NSSS equipment are also audited by PWRSD Quality Assurance. Audits of suppliers and WRD QA programs include review of internal and sub-tier auditing programs.

17.1.18.3.2 Internal

The Product Assurance Department performs audits within the PWR Systems Division. These audits cover procedures and implementation of the procedures. All PWRSD departments are subject to audit, with emphasis on design, procurement, and quality assurance activities. The audits are performed periodically by a team headed by Product Assurance personnel. Other personnel are selected from appropriate groups of PWR Systems Division and from outside divisions, as necessary. Audit findings are documented and sent to cognizant management for review and corrective action, where necessary.

Additional audits of the PWR System Division are conducted by the NES Quality Assurance Committee and the Westinghouse Headquarters Quality Assurance Staff.

17.1.18.4 Electro-Mechanical Division

EMD maintains comprehensive internal audit programs to assure that established systems are being followed or that systems adjustments are made. Audit programs also provide management with a continuing overview of quality trends, methods and functions. Formal audits are conducted by a team consisting of members from Engineering, Manufacturing, Quality Assurance and other functions not having direct responsibility for areas being studied. Deviations noted during the audit are corrected and appropriate action taken to assure against recurrence. Audit reports are formulated for review and action by management.

Additional audits of EMD are conducted by the NES Quality Assurance Committee, the Westinghouse Headquarters Quality Assurance Staff and by PWRSD Quality Assurance personnel.

17.1.18.5 Tampa Division

Quality auditing of vendors and Tampa Division internal is the responsibility of the Quality Assurance Department. Audit schedules, checklist and teams are organized to provide the necessary surveillance and feedback which assures conformance to the required standards, procedures and methods.

17.1.18.5.1 Internal Audits

Audit teams, consisting of members whose normal work responsibility lies outside that function which is to be audited, generate audit reports which are issued within five working days of the audit to point out any discrepancies which may exist. Discrepant items are brought to the attention of the responsible management personnel for investigation, follow-up and feedback documentation to provide assurance that the problem areas are resolved. Additional reports are generated where statistical analysis of problems or quality capability studies dictate the need. These internal audits provide top management a measure of current trends of quality related functions. The audit records are retained by the Quality Assurance Engineering Department.

17.1.18.5.2 Vendor Audits

The Quality Assurance Department audits both material suppliers and material manufacturers in accordance with Code requirements when neither hold an ASME Quality Systems Certificate. Vendors holding "N"

stamps are audited to assure that they are in compliance with their Quality Assurance Program and respective systems. Major pressure boundary material is source inspected and documented on a Source Inspection form which also provides a constant surveillance rating of system performance and initiates the scheduling of periodic audits with a supplier when the rating trends indicate necessary investigation. When a specific problem is noted on the Source Inspection form, immediate action is taken to review and resolve the problem within a time period to prevent recurrence. The audit records are retained by the Quality Assurance Engineering Department.

Additional audits are conducted by the NES Quality Assurance Committee, the Westinghouse Headquarters Quality Assurance Staff and by PWRSD Product Assurance personnel.

17.1.18.6 Pensacola Division

The Quality Assurance Engineering Audit Coordinator implements a program of periodic internal audits. The audits evaluate compliance with the Quality Assurance Program Manual, quality related internal procedures, and other contractual quality documents. Audits are performed utilizing written checklists, and written reports are prepared. Audit findings are reported to responsible management and specific corrective action with implementation date is documented for each audit discrepancy. Follow-up audits are conducted to assure that corrective action has been completed.

The audit coordinator initiates an annual schedule of audits to be performed. The audit teams are made up of personnel having no responsibility for performance of activities being audited.

Audits of Pensacola Division internal procedures are also conducted by the NES Quality Assurance Committee, the Westinghouse Headquarters Quality Control staff and PWR Quality Assurance personnel.

17.1.18.7 Specialty Metals Division

Internal quality audits are performed as a quality engineering function by Quality Control and Inspection. In addition, Quality Control and Inspection and Quality Services perform cross-check audits on each section. Audits are performed to determine the adequacy of established procedures for controlling quality and to evaluate the degree of compliance with the procedures.

The Quality Control and Inspection Audit Team, performing as a management audit function, is responsible for the following:

1. Investigating potential and actual problem areas which directly or indirectly affect the quality and performance of the Division's products.
2. Reporting favorable and unfavorable conditions to supervision directly responsible for corrective action.
3. Reviewing and re-auditing corrective action measures taken and the conditions that caused them to assure that such conditions have been eliminated.

Subjects of primary concern to the team are documentation, compliance with procedures follow, process conformance, product quality, and housekeeping functions. Correction of discrepancies noted by the Audit Team rests with the supervisor of the area affected, but solution and

permanent elimination of the basic problem remain the responsibility of the manager to whom that supervisor reports.

Audits of raw material subcontractors are performed by Quality Control and Inspection, to determine adequacy of the subcontractor quality assurance effort and compliance with procedures.

Additional audits of SMD are made by the NES Quality Assurance Committee, the Westinghouse Headquarters Quality Control Staff, and by Tampa and NFD Quality Assurance personnel. PWRSD does not audit SMD.

17.1.18.8 Nuclear Service Division

Product Assurance executes a planned audit program which extends to all departments and into all phases of the NSD scope of work falling under the provisions of the NSD Quality Assurance Plan.

NSD construction site activities are audited by Product Assurance on a yearly schedule to assure that proper procedures and instructions are available and in use, and that adequate controls exist and are effective. Reports of audits are sent to appropriate NSD and PWRSD management including PWRSD Product Assurance.

Audit findings requiring corrective action are handled by the corrective action system described in 17.1.16.6.

Additional audits of NSD are made by the NES Quality Assurance Committee and the Westinghouse Headquarters Quality Assurance Staff.

17.1.19 REFERENCES

1. "Nuclear Fuel Division Quality Assurance Program Plan",
WCAP-7800.

TABLE 17-1
NSSS FUNCTIONAL RELATIONSHIP FLOW SCHEDULE

ITEM	FUNCTION	ORIGINATING GROUP	PARTICIPATING GROUPS	SUBSEQUENT ACTION
1	Dissemination of contractual requirements	Project Manager		Nuclear Safety, quality assurance, functional engineering groups, PWRSD equipment design groups, field operation group, purchasing
2	Identification of regulatory requirements	Nuclear Safety	Projects, functional design groups	PWRSD equipment design groups, functional design groups, quality assurance
3	WRD Quality Assurance program	WRD quality assurance groups (through the NES Quality Assurance Committee)	WRD equipment design and manufacturing groups, projects, purchasing and safety	Applicant, WRD Quality groups
4	Quality assurance procedures	WRD quality assurance and reliability groups	WRD equipment design and manufacturing groups, projects, WRD purchasing groups, and safety	WRD quality assurance groups, applicant
5	Design control procedures	WRD equipment design groups, functional design, WRD quality assurance groups	WRD quality assurance manufacturing and purchasing groups, projects and safety	WRD equipment design and quality assurance groups, applicant

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6	Specification of system and equipment functional requirements	Functional design groups	Projects, safety and applicant	PWRSD equipment design groups, architect engineer, applicant
7	Equipment specifications or drawings	WRD equipment design groups	Functional design groups, WRD equipment design groups, quality assurance, projects, safety, applicant, architect engineer	Applicant, architect engineer, constructor, purchasing, WRD quality assurance and manufacturing groups, field operations group, suppliers
8	WRD manufacture	WRD manufacturing groups	WRD equipment design, quality control and quality assurance groups	Constructor, applicant, field operations group
9	Supplier selection and approval	WRD quality assurance, equipment design and purchasing groups	Projects WRD manufacturing groups	Supplier, purchasing
10	Supplier detail design, fabrication and inspection documents	Supplier design, manufacturing and quality control groups	WRD equipment design groups, WRD quality assurance groups	Supplier, WRD quality assurance groups
11	Product surveillance and process audits	WRD quality assurance groups	Applicant, purchasing	Projects, WRD equipment design groups, supplier
12	Quality release	Supplier, WRD quality assurance groups	WRD equipment design and purchasing groups, projects	Applicant, constructor, field operations group

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13	System layout drawings	Architect Engineer	Functional design groups, PWRSD equipment design groups	Applicant, constructor
14	Receipt inspection and erection of NSSS equipment at nuclear power plant site	Constructor	Applicant, field operations group	WRD equipment design and quality assurance groups, projects
15	Plant testing and acceptance	Applicant	Architect engineer, safety, field operations group, functional engineering groups, WRD equipment design groups	Applicant
16	Audits of:			
17	a. WRD Quality Assurance Program	Applicant, Headquarter QC Staff, WRD Quality Assurance Committee	WRD quality assurance groups	All WRD groups
18	b. NSSS design and fabrication	Applicant, WRD quality assurance groups	Architect engineer, all WRD groups	All WRD groups
19	c. NSD site activities	NSD Quality Assurance	NSD Quality Assurance, Field Operations, Technical Operations	Field Operations

The groups identified on this table relate to the functional chart depicted on Figure 17-2.

TABLE 17-2

MATRIX OF PROCEDURES ADDRESSING QUALITY ASSURANCE CRITERIA FOR MAJOR ACTIVITIES

	<u>Criteria of 10CFR50 Appendix B</u>																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
PWRSD Product Assurance Manual and Applicable Policies and Procedures	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
EMD Quality Assurance Manual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Pensacola Quality Program Manual	X	X	X	X	X	X	X	X	X	X	X	X	*	X	X	X	X	X
Tampa Quality Assurance Manual	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SMD Quality Assurance Manual	X	X		X	X	X	X	X	X	X	X	X	*	X	X	X	X	X
NSD Product Assurance and Operating Manuals	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

*Handled by specific instructions on shop travelers or in individual component specifications.

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TABLE 17-2 (Continued)

LISTING* OF PROCEDURES ADDRESSING QUALITY ASSURANCE CRITERIA FOR MAJOR ACTIVITIES

<u>Division Documented Quality Program</u>	<u>Procedures</u>	<u>Quality Assurance Criteria of 10CFR50 Appendix B Addressed by Procedure</u>
PWRSD Product Assurance Manual and Applicable Policies & Procedures	10CFR50 Appendix B Compliance	1 through 18
	PWRSD Quality Assurance Program Description	1 through 18
	Quality Requirements & Standards	3
	Qualification of Personnel	2
	Auditing Quality Assurance Programs	18
	Design Interface Control	3
	Design Verification	3
	Design Change Control	3
	Drawing Control System	3, 6
	Obtaining Copies of Drawings and/or Technical Data Documents from Master Files	6
	External Document Transmittal	6
	Document Control	6
	Procurement Document Control	11
	Documentation and Records	17
	Manufacturing Control	9, 10
	Test and Inspection	10, 11
	Control of Nonconformances, and Corrective Actions	15
	Handling, Storage, Shipping and Receiving	13
	Organization Charters	1
	Internal Audits of PWRSD	18
	External Audits of PWRSD	18
	Preparation and Control of Records Flow Schedules	17
	Files Operations	17
	Product Assurance Training	2
	Shop Order Logic Flow Diagrams	3, 6
	Interface with Corporate Records Center	17

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TABLE 17-2 (Continued)

LISTING* OF PROCEDURES ADDRESSING QUALITY ASSURANCE CRITERIA FOR MAJOR ACTIVITIES

<u>Division Documented Quality Program</u>	<u>Procedures</u>	<u>Quality Assurance Criteria of 10CFR50 Appendix B Addressed by Procedure</u>
PWRSD Product Assurance Manual and Applicable Policies & Procedures (Cont'd)	Corrective Action	16
	Equipment Specification Review	3, 5, 6
	Procurement Document Review	4, 7
	Quality Plans	7
	Engineering Drawing Review	3, 5, 6
	Control of Nonconforming Material, Parts & Components	15
	PWRSD Process/Systems Audits of other NES Divisions	18
	Supplier Surveillance Audits	9, 10, 11, 18
	Supplier Quality Assurance System Requirements	7, 4
	Supplier Evaluation & Approval	7, 4
	Customer Participation in Surveillance of PWRSD Suppliers	10, 14
	Quality Releases	10, 14
	Quality Product Documentation System	17
	Training, Qualification, and Certification of Personnel in Non-Destructive Examination (NDE) - Applicability Verified	9
	Control of Renewal Equipment Purchases	7, 4
	Identification of Equipment & Components	8
	Notification and Scheduling of Q.A. Hold/Notification Points	10
	Trip Reports	10
	Supplier Corrective Action Notice	16
	Supplier Quality Releases	10, 16
	Control of Renewal Equipment Purchases for "Service Agreement": Purchases	7, 4
	Review of Field Deficiency Reports	15, 16

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TABLE 17-2 (Continued)

LISTING* OF PROCEDURES ADDRESSING QUALITY ASSURANCE CRITERIA FOR MAJOR ACTIVITIES

<u>Division Documented Quality Program</u>	<u>Procedures</u>	<u>Quality Assurance Criteria of 10CFR50 Appendix B Addressed by Procedure</u>
PWRSD Product Assurance Manual and Applicable Policies & Procedures (Cont'd)	Administrative Specification for Procurement of Nuclear Steam Supply System Components	4, 7
	QCS-1, Quality Control System Requirements	7, 4
	QCS-2, Quality System Requirements	7, 4
	Terms and Conditions	7, 4
EMD Quality Assurance Manual	Quality Assurance Program Manual and Administration	2, 18
	Quality Assurance & Reliability Organization and Organization Charts	1
	Quality Planning	2
	Integrated Manufacturing and Quality Planning Instructions	5
	Inspection Instructions	5
	Test Instructions	5
	Quality Assurance Records	17
	Corrective Action for Nonconforming Material	16
	Auditing of Procedures and Methods to Assure Compliance to ASME Section III	18
	Analysis of Field Deficiencies	16
	Control of Documents and Changes	6
	Equipment Control and Calibration	12
	Control of Purchases	7, 4
	Receiving Inspection	7
	Confirmation of Chemical and Physical Testing	7, 8
	Weld and Braze Filler Material Control	9
	Part Identification and Control	8
	In-Process and Final Inspection and Testing	9, 10, 11

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TABLE 17-2 (Continued)

LISTING* OF PROCEDURES ADDRESSING QUALITY ASSURANCE CRITERIA FOR MAJOR ACTIVITIES

<u>Division Documented Quality Program</u>	<u>Procedures</u>	<u>Quality Assurance Criteria of 10CFR50 Appendix B Addressed by Procedure</u>
EMD Quality Assurance Manual (Cont'd)	Control of In-Process Heat Treating	9
	Control of Welding and Brazing Operations	9
	Handling, Storage and Delivery	13
	Nonconforming Material	15
	Conditional/Risk Release of Production Components	15
	Statistical Quality Control and Analysis	16
	Inspection Status Indicators	14
	Personnel Certification for Nondestructive Testing	9
	Qualification of Inspection and Test Personnel	9
	Qualification of Welding Procedures	9
	Qualification of Welders and Welding Machine Operators	9
	Nondestructive Examination Procedures	9
	Design Control	3
Pensacola Quality Program Manual	General Quality Program	1, 2
	Contract Control	3, 6
	Control of Design Functions	3
	Control of Purchases	7, 4
	Manufacturing Planning and Control	5, 8, 10, 11, 14
	Inspection	10
	Welding-Quality Assurance	9
	Nondestructive Examination, Qualification and Control	9
	Control of Measuring and Test Equipment	12
	Authorized Inspector	10
	Special Process Control	9
	Nonconforming Material Control	15
	Corrective Action	16

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TABLE 17-2 (Continued)

LISTING* OF PROCEDURES ADDRESSING QUALITY ASSURANCE CRITERIA FOR MAJOR ACTIVITIES

<u>Division Documented Quality Program</u>	<u>Procedures</u>	<u>Quality Assurance Criteria of 10CFR50 Appendix B Addressed by Procedure</u>
Pensacola Quality Program Manual (Cont'd)	Internal Quality Audits	18
	Quality Assurance Records	17
	Customer Notification Points	10, 14
Tampa Quality Assurance Manual	Organization & Responsibilities	1
	Tampa Division's Inspection Functions & Responsibilities	1
	Quality Assurance Planning	2
	Quality Assurance Records	17
	Corrective Action	16
	Equipment Control	9
	Drawing & Specification Control	6
	Vendor Control	7
	Control & Identification of Material	8
	Processing, Fabrication, Inspection & Tests	9, 10, 11, 14
	Handling & Storage	13
	Nonconforming Material & Operations	15
	Inspection Status Indication	14
	Qualification of Personnel	2
	Audits	18
	Design Verification Procedure	3
	Design Basic Documents Processing	3, 6
	Design Change Control	3, 6
	Field Changes	3, 6
	Specifications & Procedures	5
	Drawings	5
	Manufacturing Feeder Pack	5
	Quality Control Shop Order Folder	5
	Purchase Order Document Control	4
	Control of Purchased Material	7

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TABLE 17-2 (Continued)

LISTING* OF PROCEDURES ADDRESSING QUALITY ASSURANCE CRITERIA FOR MAJOR ACTIVITIES

<u>Division Documented Quality Program</u>	<u>Procedures</u>	<u>Quality Assurance Criteria of 10CFR50 Appendix B Addressed by Procedure</u>
Tampa Quality Assurance Manual (Cont'd)	Identification & Control of Materials, Parts & Components	8
	Document Control	6
	Procedures: Process Specifications & Manufacturing Procedures	5
	Drawing Control Procedure	5, 6
	Manufacturing Instructions	5
	Preparation of Manufacturing Operational Line-Ups	5, 10, 14
	Emergency Manufacturing Information (EMI)	5
	Inspection Point Program	10, 14
	Nondestructive Examination	9
	Non-NDE Examinations	10
	Verification of Heat Treatment	9
	Indoctrination and Training	6
	Quality Assurance Planning	6
	Final Inspection Prior to Shipment Preparation	10, 14
	Shipping Inspection	10
	Quality Release	10, 14
	Field Changes	3, 6
	Control of Non-Conforming Material	15
	Welding & Weld Material Control	9
	Qualification of Welding Procedures & Welders	9
	Test Control	11
	Control of Measuring & Test Equipment	12
	Material Handling	13
	Corrective Action Program	16
	Records Flow Schedule	17
	Storage Facilities	17
	Audits	18

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TABLE 17-2 (Continued)

LISTING* OF PROCEDURES ADDRESSING QUALITY ASSURANCE CRITERIA FOR MAJOR ACTIVITIES

<u>Division Documented Quality Program</u>	<u>Procedures</u>	<u>Quality Assurance Criteria of 10CFR50 Appendix B Addressed by Procedure</u>
Tampa Quality Assurance Manual (Cont'd)	Audit Personnel	18
	Vendor Audits	18
	Internal Audits	18
	Management Audits	18
SMD Quality Assurance Manual	Organization	1
	QA Program	2
	Procurement Document Control	4
	Instructions, Procedures and Drawings	5
	Document Control	6
	Control of Purchased Material	7
	Identification and Control of Materials, Parts and Components	8
	Control of Special Processes	9
	Inspection	10
	Test Control	11
	Control of Measuring and Test Equipment	12
	Handling, Storage and Shipment	13
	Inspection, Test and Operating Status	14
	Nonconforming Materials, Parts, or Components	15
	Corrective Action	16
	Quality Assurance Records	17
	Audits	18
NSD Product Assurance and Operating Manuals	Division Charter	1
	Product Assurance Department Charter	1
	Technical Operations Department Charter	1
	Field Operations Department Charter	1
	Quality Assurance Program Plan, Section 3	1
	Control of Field Service Activities	1

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TABLE 17-2 (Continued)

LISTING* OF PROCEDURES ADDRESSING QUALITY ASSURANCE CRITERIA FOR MAJOR ACTIVITIES

<u>Division Documented Quality Program</u>	<u>Procedures</u>	<u>Quality Assurance Criteria of 10CFR50 Appendix B Addressed by Procedure</u>
NSD Product Assurance and Operating Manuals (Cont'd)	Quality Assurance Policy	2
	Qualification of NSD Personnel	2
	Training NSD Personnel In The Use of Policies Procedures, or Instructions Affecting Quality	2
	PWRSD/NSD Interface Agreement	2
	NSD/NFD Interface Responsibilities	2
	Quality Assurance Program Plan, Section 2	2
	Design Change Control	3
	Drawing and Sketch Document Control	3
	Preparation and Control of Design Calculations	3
	Field Change Notice Procedure	3
	Quality Assurance Program Plan, Section 4	3
	Quality Assurance Engineering Review of Equipment Specifications	3
	Equipment Specification Preparation and Documentation	3
	Preparation, Review, and Approval of Design Drawings	3
	Design Verification	3
	Quality Levels and Requirements for Procured Items and Services	4
	Preparation and Review of Purchase Requisitions and Change Notices	4
	Quality Assurance Program Plan, Section 5	4
	Product Assurance Review of Purchase Requisitions, Orders and Changes	4
	Quality Assurance Program Plan, Section 6	5
	Preparation of Procedures for Service Activities	5
	Preparation and Control of Process Specifications	5
	Control of Field Service Activities	
	Record Control	6
	Quality Assurance Program Plan, Section 7	6
	Preparation, Review, and Control of NSD Engineering Sketches	6

TABLE 17-2 (Continued)

LISTING* OF PROCEDURES ADDRESSING QUALITY ASSURANCE CRITERIA FOR MAJOR ACTIVITIES

<u>Division Documented Quality Program</u>	<u>Procedures</u>	<u>Quality Assurance Criteria of 10CFR50 Appendix B Addressed by Procedure</u>
NSD Product Assurance and Operating Manuals (Cont'd)	Quality Assurance Program Plan, Section 8	7
	Supplier Surveillance	7
	Supplier Pre-Award Survey	7
	Quality Releases	7
	QA Audits of Suppliers	7
	Identification and Control of Material, Parts and Components	8
	Quality Assurance Program Plan, Section 9	8
	Special Materials Receipt, Storage, and Account Ability	8
	Development and Qualification of Special Processes and Procedures	9
	Nondestructive Examination (Policy)	9
	Quality Assurance Program Plan, Section 10	9
	Training, Qualification and Certification of Personnel in Nondestructive Examination	9
	Qualification of Personnel for Special Processes Other than NDE	9
	Inspection and Test Control	10
	Quality Assurance Program, Section 11	10
	Inspection and Test Control	11
	Quality Assurance Program Plan, Section 12	11
	Preparation of Procedures for Testing of Equipment	11
	Calibration and Control of Measuring and Test Equipment	12
	Quality Assurance Program, Section 13	12
	Handling, Storage and Shipping Policy	13
	Quality Assurance Program Plan, Section 14	13

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TABLE 17-2 (Continued)

LISTING* OF PROCEDURES ADDRESSING QUALITY ASSURANCE CRITERIA FOR MAJOR ACTIVITIES

<u>Division Documented Quality Program</u>	<u>Procedures</u>	<u>Quality Assurance Criteria of 10CFR50 Appendix B Addressed by Procedure</u>
NSD Product Assurance and Operating Manuals (Cont'd)	Handling, Storage, Shipping and Receiving	13
	Quality Assurance Program Plan, Section 15	14
	Inspection, Test and Operating Status	14
	Intra-Divisional Field Deficiency Reporting Procedure for Standard Scope NSSS Sites	15
	Operating Plant Deficiency Reporting Policy-Procedure	15
	Quality Assurance Program Plan, Section 16	15
	Control of Nonconformances on NSD Material and Equipment at Plant Sites	15
	Disposition of Site Quality Documentation Deficiencies	15
	Quality Assurance Program Plan, Section 17	16
	Supplier Corrective Action	16
	Internal Corrective Action	16
	NSD Quality Releases	17
	Quality Assurance Program Plan, Section 18	17
	Records Filing System	17
	Identification and Index of Records	17
	Close-out of Site QA Records	17
	Audit Policy	18
	Quality Assurance Program Plan, Section 19	18
	External Audits of NSD	18
	Internal Audits of NSD	18
	QA Audits of Suppliers	18

*The procedures are listed in approximate sequential order with their placement in the product assurance manuals. The listing provides a representative description of the procedures in use at any point in time; the procedures are constantly being evaluated and improved, with additions and deletions as required as part of the maintenance of the quality assurance program.

TABLE 17-3

RECORDS RETENTION

List of Typical Documents and Records kept by PWRSD for NSSS safety related and additional selected major components

<u>Document Description</u>	<u>Primary Retention Responsibility</u>
1. Equipment Specifications	Engineering
2. Process Specifications	Engineering
3. Instrumentation and Control Standards	Engineering
4. Drawings	Central Files, Drafting Reproduction
5. Design Verification Documentation	Engineering
6. Purchase Order, Change Notices and Procurement Advisory Releases	Purchasing
7. Equipment Prototype Test Data, Design Calculations and Stress Reports	Engineering(Retention may be delegated to a supplier)*
8. Supplier Fabricated Equipment	
a. Supplier fabricating, testing and NDT procedures	Engineering (if WRD approval required) Supplier (when WRD approval not required)*
b. Radiographs	Supplier*

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- * Quality Assurance has the responsibility for reviewing documentation maintained by the supplier and assuring that the supplier has adequate facilities for long-term retention. Purchasing has the responsibility for enforcing the contractual retention and retrieval requirements.

TABLE 17-3 (Continued)

RECORDS RETENTION

<u>Document Description</u>	<u>Primary Retention Responsibility</u>
c. Testing equipment calibration records and personnel qualifications	Supplier*
d. Mill test reports, final acceptance inspection records, special process records and performance test records	Supplier* and Quality Assurance
e. Quality Releases, Code Forms, Inspection Plans and nameplate rub-offs	Quality Assurance
f. QA trip reports, QC Plans, Deviation Notices and supplier survey reports	Quality Assurance
9. Technical Manual, Instruction Book	Engineering
10. Spare Part Forms Field Deficiency Reports**	Engineering**

* Quality Assurance has the responsibility for reviewing documentation maintained by the supplier and assuring that the supplier has adequate facilities for long-term retention. Purchasing has the responsibility for enforcing the contractual retention and retrieval requirements.

** Original records are retained by Technical Operations of Nuclear Service Division

TABLE 17-4
TYPICAL DATA PACKAGES (RETAINED BY PWR-SD)
FOR REPRESENTATIVE COMPONENTS

<u>Data Type</u>	<u>Steam Generator</u>	<u>R. C. Piping</u>	<u>R. C. Fittings</u>	<u>Let- down Hx</u>	<u>Seal Water Injec. Filter</u>	<u>Accumu- lator</u>	<u>Safety Injec. Pump</u>	<u>Boron Injec. Tank</u>	<u>R. C. Loop Stop Valve</u>	<u>Pressure Relief Valve</u>	<u>Waste Evap. Feed Pump</u>	<u>HD Adapt. Plugs</u>
Quality Release	X	X	X	X	X	X	X	X	X	X	X	X
Insp. Checklist	X	X	X	X	X	X	X	X	X			
Pressure Envelope Material Certifications	X	X	X	X	X	X	X	X	X	X	X	X
RT Records	X	X	X	X	X	X	X	X	X	X		
PT/MT Records	X	X	X	X	X	X	X	X	X	X	X	X
UT Records	X	X				X		X	X	X		X
Dimensional Records	X	X	X	X	X	X	X	X	X			X
Performance Test Data							X		X	X	X	
Code Form	X	X		X	X	X		X				
Heat Treat Records	X	X	X			X	X	X	X			
Trip Report Summary Sheet		X	X	X	X	X	X	X	X			
Nameplate Ruboff	X			X	X	X		X				
Supplier Certificate of Compliance				X	X	X		X	X	X	X	
Pressure Test Certificate				X	X	X		X	X	X	X	

TABLE 17-5 LOGIC FLOW DIAGRAM

TABLE 17-5 LOGIC FLOW DIAGRAM							SHOP ORDER		PAGE OF	
ACTIVITY DESCRIPTION	CUSTOMER	PROJECTS	OTHER DEPTS & FUNCTIONS	SHOP ORDER DEPARTMENT	PURCHASING	SUPPLIER	QUALITY ASSURANCE	FILE	10CFR50-B CRITERIA	APPLICABLE DOCUMENT
49. SUPPLIER SUBMITS DRAWINGS, PROCEDURES, CALCULATIONS AND OTHER SUBMITTALS AS REQUIRED						49. ISSUE SUBMITTALS			III-DSGN. CONTROL IV-PROCUREMENT DOC. CONTROL	PURCHASING PROCEDURE C 2.8-SUBMITTALS & DISTRIBUTION OF VENDOR DWGS & DOCUMENTS
50. PURCHASING PROCESSES SUPPLIER SUBMITTALS					50. PROCESS SUBMITTALS				III-DSGN. CONTROL IV-PROCUREMENT DOC. CONTROL	PURCHASING PROCEDURE C 2.8-SUBMITTALS & DISTRIBUTION OF VENDOR DWGS & DOCUMENTS
51. PURCHASING FORWARDS DRAWINGS TO DRAWING CONTROL & OTHER SUBMITTALS TO ENGINEERING.					51. ISSUE SUBMITTALS TO ENG				III-DSGN. CONTROL IV-PROCUREMENT DOC. CONTROL	PURCHASING PROCEDURE C 2.8-SUBMITTALS & DISTRIBUTION OF VENDOR DRAWINGS & DOCUMENTS
52. ENGINEERING SHOP ORDER DEPARTMENT REVIEWS SUBMITTALS.				52. REVIEW SUBMITTALS					III-DSGN. CONTROL IV-PROCUREMENT DOC. CONTROL	EI 23 - PROCESSING APRVL REQ. FORMS-VNDR DOC. SUBMITTALS EI 29 - DSGN CONTROL & DOCUMENTATION
53. ENGINEERING SHOP ORDER DEPARTMENT ISSUES SUBMITTALS FOR REVIEW BY APPLICABLE DEPARTMENTS.				53. ISSUE SUBMITTALS FOR REVIEW					III-DSGN. CONTROL IV-PROCUREMENT DOC. CONTROL	EI 23 - PROCESSING APRVL REQ. FORMS-VNDR DOC. SUBMITTALS EI 29 - DSGN CONTROL & DOCUMENTATION
54. APPLICABLE DEPARTMENTS REVIEW SUBMITTALS.			54. REVIEW SUBMITTALS				54. REVIEW SUBMITTALS		III-DSGN. CONTROL IV-PROCUREMENT DOC. CONTROL	EI 23 - PROCESSING APRVL REQ. FORMS-VNDR DOC. SUBMITTALS EI 29 - DSGN CONTROL & DOCUMENTATION
55. APPLICABLE DEPARTMENTS ISSUE COMMENTS ON SUBMITTALS TO ENGINEERING SHOP ORDER DEPARTMENT.			55. ISSUE COMMENTS				55. ISSUE COMMENTS		III-DSGN. CONTROL IV-PROCUREMENT DOC. CONTROL	EI 23 - PROCESSING APRVL REQ. FORMS-VNDR DOC. SUBMITTALS EI 29 - DSGN CONTROL & DOCUMENTATION
56. ENGINEERING SHOP ORDER DEPARTMENT RESOLVES COMMENTS.				56. RESOLVE COMMENTS					III-DSGN. CONTROL IV-PROCUREMENT DOC. CONTROL	EI 23 - APPROVAL REQUEST FORMS-VENDOR DOC. SUBMITTALS
57. ENGINEERING SHOP ORDER DEPARTMENT DOCUMENTS RESOLUTION, DISTRIBUTES RESOLUTION AND FILES.				57. ISSUE RESOLUTION OF COMMENTS				57. PA	III-DSGN. CONTROL IV-PROCUREMENT DOC. CONTROL	EI 23 - APPROVAL REQUEST FORMS-VENDOR DOC. SUBMITTALS
			57. ENGG USE							
58. ENGINEERING SHOP ORDER DEPARTMENT REVIEWS AND SIGNS OFF SUBMITTALS.				58. REVIEW & SIGNOFF					III-DSGN. CONTROL IV-PROCUREMENT DOC. CONTROL	EI 23 - APPROVAL REQUEST FORMS-VENDOR DOC. SUBMITTALS

Figure 17-1. Nuclear Energy Systems Organization (Water Reactors)

Figure 17-2. NSSS Functional Relationship Chart

Figure 17-3. PWRSD Quality Assurance Program Organization

Figure 17-4. Electro-Mechanical Division Quality Assurance Program Organization

Figure 17-5. Tampa Division Quality Assurance Program Organization

Figure 17-6. Pensacola Division Quality Assurance Program Organization

Figure 17-7. Speciality Metals Division Quality Assurance Program Organization

Figure 17-8. Nuclear Service Division Quality Assurance Program Organization