15.1 QUALITY ASSURANCE DURING THE OPERATIONAL PHASE

15.1.1 QUALITY ASSURANCE PROGRAM MANUAL

Palisades Nuclear Plant operational and support activities are conducted under the Entergy Quality Assurance Program Manual (QAPM). The QAPM is the top-level policy document that establishes the manner in which quality is to be achieved and presents Entergy's overall philosophy regarding achievement and assurance of quality. The QAPM responds to and satisfies the requirements of Appendix B of 10 CFR Part 50.

Selected elements of the QAPM are applied to satisfy other NRC commitments which establish quality assurance requirements. These include, but are not limited to:

- Regulatory Guide 1.143, Revision 2, November 2001, "Design Guidance for Radioactive Waste Management Systems, Structures and Components Installed in Light-water-Cooled Nuclear Power Plants" (Position C.7) – Palisades commits to the quality assurance guidance cited in Position C.7. Compliance with the remainder of the [technical] positions of Regulatory Guide 1.143 is addressed in UFSAR Chapter 11, "Radioactive Waste Management."
- Regulatory Guide 1.155, Revision 0, August 1988, "Station Blackout" (Position C.3.5) - Palisades commits to the quality assurance guidance cited in Position C.3.5, Appendix A. Compliance with Appendix B and the remainder of the [technical] positions of Regulatory Guide 1.155 is addressed in UFSAR Chapter 1.8.9, "Station Blackout" " and Chapter 8.1, "Electrical Systems.".
- Regulatory Guide 4.15, Revision 1, February 1979, Quality Assurance for Radiological Monitoring Programs (Normal Operations) – Effluent Streams and the Environment"
- Generic Letter 85-06, April 1985, "Quality Assurance Guidance for ATWS Equipment That Is Not Safety-Related". Palisades commits to the quality assurance guidance cited in the Generic Letter.
- Generic Letter 89-02/EPRI-NP-5652 (March 1988, and supplements through March 1993) – Palisades commits to compliance with the NRC endorsed industry guidance regarding selection and qualification of commercial grade suppliers and dedication of commercial grade items for use in safety related applications.

The QAPM is periodically revised to meet changing requirements. Revisions are submitted for NRC review according 10 CFR 50.54(a).

Selected elements of the Quality Assurance Program are also applied to certain equipment and activities that are not safety-related, but support safety and reliable plant operations, or where other NRC guidance establishes requirements. These include, but are not limited to;

- Emergency Preparedness
- Security
- Radiation Protection
- Fire Protection
- Aging Management Programs (See Section 15.1.2 below)

The Plant Technical Specifications presents details on the operational surveillance requirements.

15.1.2 GENERIC QUALITY ASSURANCE REQUIREMENTS FOR AGING MANAGEMENT PROGRAMS

The Palisades Quality Assurance Program implementation procedures will apply the elements of corrective action, confirmation process, and administrative controls to both safety related and non-safety related systems, structures, and components that were subject to aging management review of license renewal.

Generically, these three elements will be applicable to Aging Management Programs under the renewed operating license, as follows:

Corrective Actions:

Corrective actions are implemented in accordance with the requirements of 10 CFR 50, Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants,” and the Entergy Quality Assurance Program Manual. Entergy implements a corrective action program to promptly identify, control, document, classify, and correct conditions adverse to quality. In addition, for significant conditions adverse to quality, the program provides for cause evaluation and corrective actions to prevent recurrence. Significant conditions adverse to quality and significant adverse trends are documented and reported to responsible management.

Confirmation Process:

The confirmation process is part of the corrective action program, which is implemented in accordance with the requirements of 10 CFR 50, Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants,” and the Entergy Quality Assurance Program Manual. The corrective action program includes provisions to ensure that corrective actions for significant conditions adverse to quality are completed as intended and are not inadvertently nullified by subsequent actions. Results of evaluations of conditions adverse to quality are analyzed to identify trends.

Administrative Controls:

Plant programs are implemented through a variety of procedures and other documents. These implementing documents are subject to administrative controls, including a formal review and approval process, in accordance with the requirements of 10 CFR 50, Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants,” and the Entergy Quality Assurance Program Manual. Administrative procedures provide guidance on procedures and other forms of administrative control documents. Uniform guidelines and requirements are provided for preparing, revising, reviewing, and approving procedures. Usage and adherence requirements are also defined for plant procedures.

NOTE: Section 15.2 is historical information as defined by NEI 98-03 Revision 1 and updates to this section are not expected.

15.2 QUALITY ASSURANCE DURING ORIGINAL PLANT DESIGN AND CONSTRUCTION

The information provided herein is a programmatic outline of the QA Program that was in effect during design and construction phases of Palisades. Specific implementation discussions are contained within other chapters, providing information and details unique to that system or component as it relates to manufacturing, installation or testing.

15.2.1 BECHTEL CORPORATION

15.2.1.1 General

Shop inspection of all critical materials and components, including the NSSS equipment, was undertaken by the Bechtel Inspection Department. Inspection of construction work was carried out by qualified field supervisory personnel and field engineers. Some field engineers were assigned full time (resident engineers) at primary vendor manufacturing facilities with the responsibility of providing continuous surveillance and AE/manufacturer technical interface. In addition project design personnel made frequent visits to the jobsite to coordinate design and construction. Special measures beyond those normally employed in construction were instituted and implemented for the quality control of Class 1 structures and systems.

15.2.1.2 Organization

Shop inspection of all materials and components for Class 1 structures and systems was conducted by the Bechtel Inspection Department to ensure compliance with applicable specifications, drawings, codes and standards. This inspection organization was nationwide and had no expediting responsibilities whatsoever.

A formal quality assurance reporting system was employed to assure that Class 1 structures and systems were constructed in accordance with applicable specifications and drawings. Refer to Figure 15-1 for a chart of the quality assurance organization. A Nuclear Quality Assurance Manual to implement this system was prepared and distributed to the field. This manual established standard inspection and reporting procedures for Bechtel field personnel.

Field inspection was carried out by the permanent field engineering staff located at the jobsite under the surveillance of a Quality Assurance Engineer who was also located at the jobsite and permanently assigned to this position.

The Quality Assurance Engineer reported directly to the Project Engineer in the home office and was completely independent of the construction organization. The Quality Assurance Engineer was thoroughly familiar with quality control requirements and was experienced in the application of codes and standards. He had free access to all design drawings and specifications, direct access to all phases of the construction work and continuously monitored the field inspectors' work.

The number of field engineers assigned at any one time depended upon the current inspection workload. However, one man was assigned with the responsibility for inspection in each area of activity; eg, civil, electrical, mechanical, piping, etc. The field engineers were entirely knowledgeable in their areas, some were graduate engineers. They were thoroughly familiar with the design specifications, design drawings, applicable codes, and sampling and testing procedures pertaining to their areas of responsibility.

Independent testing laboratories were used for quality control and testing and reporting of the concrete materials, and for user's testing of reinforcing steel, liner plate and tendon material. The independent testing laboratories submitted duplicate reports of their findings to both the QAE and CP Co.

15.2.2 COMBUSTION ENGINEERING, INC

15.2.2.1 General

The Quality Assurance Program for the nuclear steam supply system furnished by Combustion Engineering, Inc, included establishment of design criteria, safety analysis, systems and detailed design, manufacture, engineering to follow manufacture, quality control-inspection and quality control-surveillance during manufacture of this equipment. In addition, Combustion Engineering provided technical advisory service to the owner or his architect-engineer regarding the shipment, field erection, initial checkout and start-up of Combustion Engineering equipment.

15.2.2.2 Organization

The organization established at Combustion Engineering to accomplish the Quality Assurance Program is described in Figure 15-2.

All effort on the Palisades Project at Combustion Engineering was under the direction of the Project Manager at Windsor, Connecticut. The engineering effort related to the establishment of criteria, safety analysis, systems and detailed design was performed within the PWR Engineering Department and the Physics Department at Windsor, Connecticut. Manufacture of the equipment for the nuclear steam supply systems in accordance with specifications and drawings prepared by the PWR Engineering Department was performed either in Combustion Engineering's own facilities (Nuclear Components Department, Chattanooga, Tennessee and P F Avery Company, Billerica, Massachusetts) or by direct procurement from vendors outside of Combustion Engineering's corporate structure. During the course of manufacture, engineering liaison with the manufacturer was maintained by the Project Manager or his representatives.

Two levels of quality control were provided within the Combustion Engineering corporate structure and in its procurement relationship with outside vendors. The first level, which was identified as the quality control-inspection, was provided by the component vendor (either Combustion Engineering or an outside vendor). The quality control-inspection activity was carried out under the direction of a Quality Control Manager within the vendor's organization, whose responsibilities and line of authority were separate and distinct from the manufacturing responsibility. In each case, it was the Quality Control Manager's responsibility to provide the procedures, organization and services necessary to control, confirm and record that the component was built in accordance with the approved drawings and specifications.

The second level of quality control was identified as quality control-surveillance. This level of quality control was carried out by the Combustion Engineering organization at Windsor, Connecticut. Its purpose was to assure that the quality control organization, planning and procedures established at the vendor's plants were effective in meeting primary quality control requirements. The quality control-surveillance activity was carried out by two departments at Windsor, depending upon whether the equipment involved was procured from Combustion Engineering or from an outside vendor. The Quality Control Manager for the Utility Division was responsible for quality control-surveillance of all outside-procured equipment and items produced at Windsor. The Nuclear Power Department was responsible for quality control-surveillance for equipment procured from other Combustion Engineering plants.

15.2.2.3 Responsibilities

The specific identification of how the quality control-inspection and quality control-surveillance responsibilities of the various departments interact was as described in the following paragraphs:

The Nuclear Power Department Quality Control Manager was responsible for quality control-inspection of the products manufactured by Combustion Engineering in Windsor, Connecticut. This included quality control of material and components procured on the outside which were brought into Windsor before shipment to the Palisades site such as fuel pellets and fuel cladding tubing.

The Nuclear Power Department Quality Control Manager was also responsible for quality control-surveillance of components and equipment manufactured within the company at sites outside of Windsor. In particular, this included pressure vessels, steam generators and similar items manufactured by Combustion Engineering's Nuclear Component Department at Chattanooga, Tennessee, and reactor vessel internals manufactured by the P F Avery Company at Billerica, Massachusetts. Representatives were permanently located at these plants who reported directly to the Nuclear Power Department Quality Control Manager in Windsor.

The Nuclear Component Department Quality Control Manager at Chattanooga was responsible for quality control-inspection of nuclear products manufactured at Chattanooga and quality control of all purchased parts and materials brought into Chattanooga. The P F Avery Company Quality Control Manager had similar responsibilities for products and materials at the P F Avery Company.

A small portion of the fabrication of both steam generators was done at the Palisades site (approximately 5%-10%). The work was performed under the direction of the Combustion Engineering Erection Department. Personnel from the Erection Department who were familiar with the design of the NSSS had received several weeks of training at the Chattanooga shops on the fabrication and quality control inspection of the Palisades steam generators, while these units were undergoing shop fabrication. This training in shop procedures allowed these Erection Department supervisors and trades foremen to assure that the field fabrication of the steam generators was to the same quality as the shopwork. These Erection Department personnel were present at the site during all field fabrication work performed on the steam generators.

In addition to the Erection Department personnel, the Chattanooga Quality Control Department responsible for quality control-inspection assigned several personnel to be present during the site fabrication of the steam generators. Their personnel assured that the inspection techniques used and records kept at the site were identical to those in the Chattanooga shops.

The Nuclear Power Department Quality Control Manager was also responsible for the quality control-surveillance of the field fabrication work performed on the steam generators.

The Quality Control Manager for the Utility Division was responsible for quality control-surveillance of components and equipment procured outside of Combustion Engineering which were shipped directly to the Plant site. This included, for example, reactor coolant pumps, high-pressure and low-pressure safety injection pumps and other elements of the auxiliary systems. He was also responsible for quality control-surveillance of products manufactured at Windsor such as fuel assemblies, control elements and control drive mechanisms. Combustion Engineering assigned representatives to subsuppliers based upon individual component requirements. A permanent resident engineer was assigned to the Byron Jackson manufacturing facility during the manufacturing, testing and subsequent rework of the reactor coolant pumps.

In addition to the Combustion Engineering quality control inspections performed on CE-supplied components, these components received independent inspection by Bechtel, Consumers Power and AEC Division of Compliance inspectors.

A discussion of quality control of the reactor vessel is found in Section 4.5.

15.2.3 CONSUMERS POWER COMPANY

15.2.3.1 General

Consumers Power quality control activities were directed to the two areas of vendor shop operations and field construction. These activities were in the form of an audit of the quality control procedures and operations performed in the vendor shops and in the field.

15.2.3.2 Vendor Shops

Consumers Power contracted with Bechtel Corporation to perform the prime quality control-surveillance in the vendor shops. These activities were carried out by the Bechtel Inspection Organization located throughout the country. In some instances, where the workload required, an independent testing laboratory supplemented the work of the Bechtel inspectors. Bechtel Corporation performed quality control-surveillance on all major mechanical items for the Palisades Plant except the nuclear fuel.

Consumers Power representatives made frequent visits to vendors' shops in conjunction with the Bechtel inspectors to verify that proper procedures and records were being maintained at the various facilities. These visits were usually of a one- to two-day duration during which the Consumers Power representative made spot checks of material records, shop procedures and quality control records. In addition to the quality control visits, Consumers Power representatives made several visits to vendor shops for the witnessing of final performance tests of finished equipment or subcomponents.

A partial listing of the components on which shop quality control and performance testing visits were made is as follows:

1. Reactor vessel
2. Steam generators
3. Pressurizer
4. Primary piping
5. Control rod drive mechanism
6. Nuclear fuel
7. Primary coolant pumps and motors*
8. Nuclear instrumentation*
9. High-pressure injection pumps*
10. Low-pressure injection pumps*
11. Containment spray pumps*
12. Containment air coolers*
13. Feedwater heaters*
14. Turbine generator
15. Main feed pumps*
16. Auxiliary feed pumps*
17. Feed pump turbine drivers*

18. Charging pumps*

19. Emergency diesel generators*

20. Miscellaneous pumps, heat exchangers and piping

Those systems identified by an asterisk received a performance witness test attended by a Consumers Power Company/Bechtel representative.

The auditing of vendor quality control activities ensured proper manufacturing procedures with a resultant quality product.

15.2.3.3 Nuclear Fuel

Consumers Power assumed quality control-surveillance for the manufacture of the nuclear fuel. Routine inspection trips were made approximately once per week to Combustion Engineering, the manufacturer of the fuel, and approximately once per month to the tubing and pellet manufacturers. During these visits, components which had been inspected were selected at random and a reinspection conducted in the presence of the Consumers Power inspector. In addition, a review was made of all vendor quality control records pertaining to the component. Particular attention was given to the following items during the surveillance:

1. Spacer grids

2. Fuel rod assembly

    a. Tubing

    b. Pellets

    c. Upper and lower end cap welds

    d. Helium leak tests

    e. Corrosion resistance tests

    f. Alpha smear tests

3. Instrument tubes

4. Poison rods

5. Final fuel bundle assembly inspection

6. Preparation for shipping

7. Shipping containers

In addition to the inspections to ascertain that proper quality control levels were being maintained, the vendors were also required to justify their selection of parameters and values which were monitored during the manufacturing process.

15.2.3.4 Construction Activities

Consumers Power Construction Department performed quality control-surveillance of field construction activities. This was accomplished by the Construction Field Superintendent and engineers assigned to the job-site. Bechtel Corporation, as the constructor, had prime quality control responsibility for the fieldwork. Consumers Power personnel performed independent quality control functions through witnessing all tests including hydrostatic testing and reviewing of material tests and radiographs. Materials testing included (but was not limited to) concrete cylinder breaks, concrete mixing water reports, rebar tensile test reports, grout compression test reports and standard deviations on concrete test cylinders. Review of radiographs was supplemented by Consumers Power Gas Construction personnel who were experienced in this area. Besides the review of tests, Consumers Power personnel observed the daily construction activities to verify that they were in conformance with appropriate construction practices. The Construction Field Superintendent could stop any phase of the operation if he felt the work was not being satisfactorily performed.

In addition to the construction activities, Consumers Power personnel made an independent check of equipment as it arrived onsite and observed proper handling and storage until it was placed. After installation, continual checks were made to ensure that it was properly protected until ready for initial operation.

These activities in conjunction with the work of the Bechtel Field Quality Assurance Organization have ensured proper construction practices.