SWESSAR-P1

AMENDMENT 40

July 10, 1979

PWR REFERENCE NUCLEAR POWER PLANT
SAFETY ANALYSIS REPORT

ASSEMBLY INSTRUCTIONS

Remove	Insert	Insertion Location
-	Assembly Instructions	Front of Vol. 1
-	S&W Letter	Front of Vol. 1
-	Notarized Statement	Front of Vol. 1
-	Appendix 3C Tab	After Fig. 3B.11-4 (Volume 3)
-	3C-a	
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STONE & WEBSTER ENGINEERING CORPORATION

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July 16, 1979

RPS-373

Mr. Roger S. Boyd, Director
Division of Project Management
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Sir:

DOCKET NO. STN 50-495
S&W REFERENCE NUCLEAR POWER PLANT

Forwarded for Nuclear Regulatory Commission review are 70 copies of Amendment 40 to the Stone & Webster Standard Safety Analysis Report, SWESSAR-P1.

Amendment 40 incorporates into SWESSAR-P1 those items that need to be addressed as described by letter to Mr. Roger S. Boyd from Mr. W. J. L. Kennedy dated May 3, 1979. This amendment also addresses the extent to which the design complies with Regulatory Requirements Review Committee Category I items.

Amendment 40 is printed on white pages and is applicable to SWESSAR/RESAR-41, SWESSAR/CESSAR, SWESSAR/RESAR-3S, and SWESSAR/BSAR-205.

Very truly yours,

W. J. L. Kennedy

W. J. L. Kennedy
Vice President

Enclosure

JHM:EMK

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of: July 16, 1979

Stone & Webster Engineering Corporation Docket No. STN-50-495

Pressurized Water Reactor
Reference Nuclear Power Plant

APPLICATION FOR REVIEW OF
"STONE & WEBSTER STANDARD SAFETY ANALYSIS REPORT"

AMENDMENT 40

Stone & Webster Engineering Corporation hereby applies for Nuclear Reactor Regulatory Commission Regulatory Staff and Advisory Committee on Reactor Safeguards review of Amendment 40 to "Stone & Webster Engineering Corporation Standard Safety Analysis Report" (SWESSAR-P1), pursuant to Appendix O to 10CFR50, "Standardization of Design, Staff Review of Standard Designs."

STONE & WEBSTER ENGINEERING CORPORATION

By W. J. L. Kennedy
W. J. L. Kennedy
Vice President

Subscribed and Sworn to before me
this 16th day of July 1979.

Notary

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APPENDIX 3C

EXTENSION REVIEW MATTERS FOR PRELIMINARY DESIGN APPROVALS

LIST OF EFFECTIVE PAGES

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APPENDIX 3C

EXTENSION REVIEW MATTERS FOR PRELIMINARY DESIGN APPROVALS

The following items[1] are not within the SWESSAR-P1 scope (Utility-Applicant or NSSS scope—31 items).

Category I: Items 3, 8, 9, 15, 16, 17, 20, 24, 26, 28, 34, 38, 39, 40, 44, 45, and 49

Category II: Items 6, 18, and 19

Category III: Items 1, 3, 4, 5, 7, 9, and 11

Category IV-C: Items 4, 7, 8, and 11

The following items have NRC implementation dates prior to the NRC cutoff date for SWESSAR/BSAR-205 which is September 1976. Since the applicable items are generic to S&W design (white pages), the NRC review and conclusion relative to SWESSAR/BSAR-205 are applicable (44 items).

Category I: Items 6, 14, 21, and 22

Category II: Items 1, 2, 8, 16, and 17

Category III: Item 6

Category IV-A: Items 1 through 6

Category IV-B: Items 1 through 23

Category IV-C: Items 2, 3, 13, 18, and 19

The following items are duplicated or the response is already in SWESSAR-P1 even though the implementation date is after September 1976 (10 items).

Category I: Items 7, 13, and 42

Category II: Items 5, 15, and 20

Category IV-C: Items 1, 4, 14, and 17

The remaining items listed below are addressed in Sections 3C.1 through 3C.4 even though they are not considered significant safety issues. These items are applicable to the SWESSAR-P1

[1]The NRC letters of January 24, 1979 (Enclosure 1 to W.J.L. Kennedy's letter of May 3, 1979 to Roger Boyd) listing Categories I, II, III, and IV matters identifies the item numbers. These items were numbered by S&W in some cases.

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design and the NRC implementation date is after September 1976, the cutoff date for SWESSAR/BSAR-205 (43 items).

29, 30, 31, 32, 33, 35, 36, 37, 41, 43, 46, 47, and 48

Category II: Items 3, 4, 7, 9, 10, 11, 12, 13, and 14

Category III: Items 2, 8, and 10

Category IV-C: Items 6, 9, 10, 12, 15, and 16

3C.1 REGULATORY REQUIREMENTS REVIEW COMMITTEE (RRRC) CATEGORY I

Item 1 - RG 1.7, Rev 2 (1/31/78) Control of Combustible Gas Concentrations in Containment Following a Loss of Coolant Accident

Response

The control of combustible gas concentrations in the containment following a loss of coolant accident complies with RG 1.7, Rev 2, dated November 1978.

Item 2 - RG 1.9, Rev 1 (9/1/78) Selection of Diesel Generator Set Capacity for Standby Power Supplied

Response

The selection of emergency diesel generator sets complies with RG 1.9, Rev 1, dated November 1978.

Item 4 - RG 1.28, Rev 1 (11/29/77) Quality Assurance Program Requirements (Design and Construction)

Response

The position on RG 1.28, Rev 1, is given in Topical Report SWSQAP 1-74A.

Item 5 - RG 1.29, Rev 3 (6/20/78) Seismic Design Classification

Response

Seismic design classifications comply with RG 1.29, Rev 3, dated September 1978.

Item 10 - RG 1.38, Rev 2 (5/77) Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants

Response

QA requirements for packaging, shipping, receiving, storage, and handling comply with RG 1.38, Rev 2, dated May 1977.

Item 11 - RG 1.39, Rev 2 (7/12/77) Housekeeping Requirements for Water-Cooled Nuclear Power Plants

Response

Housekeeping requirements comply with RG 1.39, Rev 2, dated September 1977.

Item 12 - RG 1.52, Rev 2 (11/29/77) Design, Testing, and Maintenance Criteria for Atmosphere Cleanup System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants

Response

Design, testing, and maintenance of post-accident engineered safety features (ESF) atmosphere cleanup system air filtration and adsorption units comply with RG 1.52, Rev 2, dated March 1978, with the following modifications or exceptions:

Paragraph C.2.a

Demisters are provided in ESF atmosphere cleanup systems only when there is a potential for entrained water droplets in the airstream.

Paragraph C.2.f

Filter component layouts normally consist of a maximum of 3 high efficiency particulate air (HEPA) filters high and 10 HEPA filters wide.

If individual filter components with capacities greater than 1,000 cfm are used, the system flow rate may be greater than 30,000 cfm.

Paragraph C.2.h

The following exceptions are taken to the requirement that "all instrumentation and equipment controls should be designed to IEEE 279":

1. All instruments and equipment controls that sense or process one or more variables and that act to accomplish the protective function are designed in accordance with IEEE 279. These include sensors, signal conditioners, logic, and actuation device control circuitry. (The protective function with which the subject guide is concerned is atmospheric cleanup to mitigate accident doses.)

2. In addition, a very limited class of analog indicators may be designed in accordance with selected applicable paragraphs of IEEE 279.

   The basis for selecting specific indicators to be so designed is their significance to safety.

   All paragraphs of IEEE 279 are applicable except 4.12, 4.13, 4.15, 4.16, and 4.17.

   For this limited class of indicators, redundant analog channels are provided. One channel is recorded. The systems are designed to operate before and after, but not necessarily during, a safe shutdown earthquake.

3. Annunciator functions are incorporated in overall system design. Annunciators are not safety-related; therefore, they are not designed in accordance with IEEE 279.

Paragraph C.2.j

ESF atmosphere cleanup systems are designed to be removed as a minimum number of segmented sections. Individual filter components will be removed prior to cutting the housing into segmented sections.

Paragraph C.2.l

Housing leak tests are performed in accordance with the provisions of Section 6 of ANSI N510-1975 as recommended in this paragraph. However, ductwork tests are performed using acceptable methods of the Associated Air Balance Council.

Paragraph C.3.d

All HEPA filters are shipped to an NRC Quality Assurance Station for testing. However, if data confirm that HEPA filters are damaged by the additional transportion, and/or the handling at the NRC facility, the decision to send all HEPA filters for additional testing will be reconsidered.

Paragraph C.3.e

Filter and adsorber mounting frames are constructed and designed in accordance with the recommendations of Section 4.3 of ERDA 76-21, except for the frame tolerance guidelines in Table 4.2. The tolerances selected for HEPA and adsorber mountings are sufficient to satisfy the bank leak test criteria of Paragraphs C.5.c and C.5.d of RG 152, Rev 2.

Paragraph C.3.f

Filter component layouts normally consist of a maximum of 3 HEPA filters high and 10 HEPA filters wide.

If individual filter components with capacities greater than 1,000 cfm are used, the system flow rate may be greater than 30,000 cfm.

Paragraph C.3.h

Exception is taken to the recommendations of Section 4.5.8 of ERDA 76-21 relative to drain sizes and arrangement. Normally closed manual valves, instead of water seals and traps, will be provided to control the discharge of the fire sprinkler flow.

Paragraph C.3.i

The dwell time for the minimum 2 in. of the carbon adsorber unit is 0.25 sec. For bed depths greater than 2 in., where the dwell time is less than 0.25 sec per 2 in. of total bed depth, experimental verification of filter efficiency will be provided.

Paragraph C.3.k

When conservative calculations show that the maximum decay heat generation from collected radioiodines is insufficient to raise the carbon bed temperature above 250 F with no system airflow, small capacity ESF atmosphere cleanup systems may be designed without an air bleed cooling mechanism.

Exception is taken to the requirement of any cooling mechanism satisfying single-failure criteria because a backup mechanism is provided.

In addition, exception is taken to providing humidity control for the decay heat removal system cooling air flow which uses room air of less than 70 percent relative humidity.

Paragraph C.3.l

System resistances will be determined in accordance with Section 5.7.1 of ANSI N509-1976 except that fan inlet and outlet losses will not be calculated in accordance with AMCA 201.

Exception is taken to Section 5.7.2 of ANSI N509-1976; copies of fan ratings or test reports are not necessary when certified fan performance curves are furnished.

Exception is taken to balancing techniques defined in Section 5.7.3 of ANSI N509-1976. Displacement criteria following normal industry practice will be used when the maximum vibration velocity method imposes unrealistic requirements at certain operating speeds.

Documentation will not be furnished in accordance with Section 5.7.5 where AMCA certification ratings are submitted.

Paragraph C.3.n

Exception is taken to Section 5.10.3.5 of ANSI N509-1976; ductwork, as a structure, will have a resonant frequency above 25 Hz, but this may not be true for the unsupported plate or sheet sections.

Paragraph C.3.p

Exception is taken to the provisions in Section 5.9 of ANSI N509-1976 of designing dampers to ANSI B31.1 and to using butterfly valves. Class B dampers may be designed and tested to meet the verification of strength and leaktightness necessary for use in a contaminated air stream. (Note: This exception does not pertain to containment penetrations.)

In addition, exceptions are taken to the following:

- Class B leakage rates shall be determined for one damper of each type instead of every damper.
- Minimum diameter of damper shaft length 24 in. and under shall be 1/2 in.; and 3/4 in. for shafts between 25 and 48 in.

Paragraph C.4.a

Exception is taken to full compliance with Section 2.3.8 of ERDA 76-21, i.e., S&W does not use any communication system, floor drains are as noted in Paragraph C.3.h above,

decontamination areas and showers are not "nearby," filters are not used as duct inlets, and duct inspection hatches are not provided.

Paragraph C.4.d

ESF atmosphere cleanup systems are run a minimum of 10 hours per month. However, if field data confirm that it is unnecessary to run the trains 10 hours per month to reduce the amount of moisture present on the filters, this decision will be reconsidered.

Item 18 - RG 1.84, Rev 12 (3/78) Code Case Acceptability ASME Section III, Design and Fabrication

Response

Code cases utilized for ASME Section III design and fabrication comply with RG 1.84, Rev 12, dated March 1978.

Item 19 - RG 1.85, Rev 12 (3/78) Code Case Acceptability ASME Section III Materials

Response

Code cases utilized for ASME Section III materials comply with RG 1.85, Rev 12, dated March 1978.

Item 23 - RG 1.95, Rev 1 (10/21/76) Protection of Nuclear Power Plant Control Room Operators Against an Accidental Chlorine Release

Response

The protection of control room operators against an accidental chlorine release complies with RG 1.95, Rev. 1, dated January 1977, with the following exceptions or clarifications:

1. Regulatory Position C.3 - In lieu of C.3, an evaluation of control room habitability is performed using the general design considerations in RG 1.78. Specific design features and procedures are defined, to the extent necessary, to assure the chlorine concentration inside the control room could not exceed

15 ppm by volume (45 mg/m^3) within 2 minutes of detection and that the operator is protected.

2. Regulatory Position C.4 - The charcoal filters are not designed to remove or limit chlorine accumulation; however, the filters will be used for chlorine removal even though their design basis is purely radiological.

   The surveillance requirements of the Standard Technical Specifications (NUREG-0123, October 1976) are used in lieu of those suggested in the regulatory guide.

Item 25 - RG 1.100, Rev 1 (6/14/77) Seismic Qualifications of Electrical Equipment for Nuclear Power Plants

Response

Seismic qualification of Class 1E equipment complies with RG 1.100, Rev 1, dated August 1977.

Item 27 - RG 1.106, Rev 1 (1/28/77) Thermal Overload Protection for Electric Motors on Motor-Operated Valves

Response

Thermal overload protection for electric motors on motor-operated valves complies with RG 1.106, Rev 1, dated March 1977.

Item 29 - RG 1.116, Rev 0-R (5/77) Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems

Response

The position on Regulatory Guide 1.116, Rev 0-R, is given in Topical Report SWSQAP 1-74A.

Item 30 - RG 1.118, Rev 1 (9/27/77) Periodic Testing of Electric Power and Protection Systems

Response

The periodic testing of electric power and protection systems complies with RG 1.118, Rev 1, dated November 1977 with the following clarifications regarding sensor response time testing:

1. The response time of electrical protective relays and motion sensors will be verified by including them in the response time test of the protection system.

2. Pressure and level sensors shall be included in the response time test of the protection system to determine if the response time is adequate with regard to achieving the intended safety function.

3. Radiation, temperature, and some types of in-line electrical and fluid sensors will not be quantitatively tested for response time after installation. Verification of proper installation and calibration shall be used as an indirect means of assuring proper response times. Equipment suppliers shall be required to verify the sensor response time adequacy. These response times will be combined with system response time, which is measured independently of the sensor.

4. Bench testing, in lieu of in situ testing, shall not be required.

Item 31 - RG 1.120, Rev 1 (5/11/77) Fire Protection Guidelines for Nuclear Power Plants

Response

SWESSAR has been revised (Amendments 30, 33, and 38) to address BTP APCSB 9.5-1 and RG 1.120 in response to NRC letter of September 30, 1976, and in response to April 27, 1977 meeting with NRC. Additional design changes and information similar to that provided for SWESSAR/CESSAR and SWESSAR/RESAR-3S in Amendment 38 will be provided with a Utility-Applicant CP application referencing SWESSAR/RESAR-41.

Item 32 - RG 1.122, Rev 1 (11/15/77) Development of Floor Design Response Spectra for Seismic Design of Floor-Supported Equipment or Components

Response

Floor design response spectra for seismic design of floor supported equipment and components comply with RG 1.122, Rev 1, dated February 1978.

Item 33 - RG 1.123, Rev 1 (7/77) Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants

Response

The position on RG 1.123, Rev 1, is given in Topical Report SWSQAP 1-74A.

Item 35 - RG 1.128, Rev 1 (6/20/78) Installation Design and Installation of Large Lead Storage Batteries for Nuclear Power Plants

Response

The installation design and the installation of large lead storage batteries comply with RG 1.128, Rev 1, dated October 1978 except that hydrogen detectors are not required.

Item 36 - RG 1.129, Rev 0 (2/18/77) Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Nuclear Power Plants

Response

The maintenance, testing, and replacement of large lead storage batteries comply with RG 1.129, Rev 0, dated April 1977.

Item 37 - RG 1.131, Rev 0 (5/26/77) Qualification Tests of Electrical Cables, Field Splices, and Connections

Response

Qualification tests of Class 1E electric cables, field splices, and connections comply with RG 1.131, Rev 0, dated August 1977 except that field splices are not included in the design unless very long power cable runs are utilized. Type tests of Class 1E cables are discussed in Section 8.3.1.4.4.

Item 41 - RG 1.136, Rev 0 (8/31/77) Materials for Concrete Containments

Response

The material used for concrete containments complies with RG 1.136, Rev 0, dated November 1977.

Item 43 - NUREG-0102 (SRP 1.8) Interfaces for Standard Designs

Response

Interfaces are in general in Section 1.8. In Section 1.8, tables of acceptable interface information are provided for interface with NSSS and Utility-Applicant and the applicable interfaces of NUREG-0102 are identified.

Ite. - RG 1.140, Rev 0 (11/29/77) Design, Testing, and Maintenance Criteria for Normal Ventilation Exhaust System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants

Response

Design, testing, and maintenance criteria for normal ventilation exhaust system air filtration and adsorption units comply with RG 1.140, Rev 0, dated March 1978, with the following modifications and exceptions:

C.2.b Filter component layouts will normally be no more than 3 HEPA filters high and 10 HEPA filters wide. If individual filter components with capacities greater than 1,000 cfm are used, the system flow rate may be greater than 30,000 cfm.

C.2.f Housing leak tests are performed in accordance with the guide, but ductwork leak tests are performed using the methods of the Associated Air Balance Council instead of ANSI N510-1975.

C.3.c For HEPA filters and adsorber mountings, the requirements of ANSI N509-1976 Section 5.6.3 will be complied with except for the tolerance requirements. The tolerances for HEPA filters and adsorber mounting frames will be sufficient to pass the bank leak tests of Paragraphs 5.c and 5.d of the guide.

C.3.g The dwell time for a charcoal adsorber unit with minimum 2 in. bed depth will be 0.25 sec. For bed depths greater than 2 in. where the dwell time is less than 0.25 sec per 2 in. bed depth, experimental verification of filter efficiency will be provided.

C.3.h Exception is taken to Section 5.2.2.4 of ANSI N509-1976 which calls for a means of compaction to uniform density. Where uniform compaction can be demonstrated, compacting means shall not be required.

C.3.i 1) System resistances will be determined in accordance with Section 5.7.1 of ANSI N509-1976 except that fan inlet and outlet losses will not be calculated in accordance with AMCA 201.

2) Exception is taken to Section 5.7.2 of ANSI N509-1976. Copies of fan ratings or test reports are not necessary when certified fan performance curves are furnished.

3) Exception is taken to Section 5.7.3 of ANSI N509-1976. Balancing techniques specified need not be followed. Maximum permissible vibration velocity level method need not be complied with.

4) Exception is taken to Section 5.7.5 of ANSI N509-1976. Where AMCA certification ratings are submitted, documentation will not be furnished.

C.3.k The air flow distribution will be within ±20 percent of the average air flow as tested in accordance with ANSI N510-1975. Turning vanes will be provided only where a uniform air distribution can not be achieved.

C.3.l Exception is taken to Section 5.9 of ANSI N509-1976:

1. Dampers will not be designed to the specifications of ANSI B31.1.

2. Butterfly valves will not be used.

3. Class B leakage rates will be determined for one damper of each type instead of every damper.

4. Dampers with shaft lengths ≤24 in. will have a minimum shaft diameter of 1/2 in. Dampers with shaft lengths >24 in. and ≤48 in. will have a minimum shaft diameter of 3/4 in.

NOTE: Items 1 and 2 do not pertain to containment penetrations.

<u>Item 47</u> - RG 1.142, Rev 0 (1/31/78) Safety-Related Concrete Structures

<u>Response</u>

The procedures and requirements for the design, fabrication, erection, and testing of safety-related concrete structures (other than the reactor containment) comply with RG 1.142, Rev 0, dated April 1978 with the following exceptions:

1. Regulatory Position C.3 - ACI 349, and not the special ductility requirements of Appendix A of ACI 318-71, will be used for design.

2. Regulatory Position C.7 - Samples for compressive strength tests of each class of concrete will be taken not less than once each day concrete is placed nor less than once for each 150 cu yd of concrete in accordance with both ACI 318 and ACI 349.

3. Regulatory Position C.8 - Pipes which contain liquid, gas, or vapor which are embedded in concrete will be pressure tested under the applicable piping standard.

4. Regulatory Positions C.9a, C.9b, C.9c, and C.9d - The load factors given in ACI 349 will be used.

<u>Item 48</u> - RG 8.19, Rev 0 (3/14/78) Occupational Radiation Dose Assessment at LWRs - Design Stage Man-Rem Estimates

<u>Response</u>

Estimates of occupational radiation doses for selected normal operational activities are described in Section 12.1.6. Routine and inservice inspection are not included.

3C.2 REGULATORY REQUIREMENTS REVIEW COMMITTEE (RRRC) CATEGORY II

Item 3 - RG 1.59, Rev 2 (8/77) Design Basis Floods for Nuclear Power Plants

Response

The design complies with the regulatory positions of RG 1.59, Rev 2, with the following exception: For a site on a water body of more complex geometry, such as semi-enclosed bay, the S&W two-dimensional model described in S&W Topical Report SWECO 7501-P-A (and the nonproprietary version SWECO-7501-NP-A), entitled "Two Dimensional Coastal Storm Surge Model," will be used.

Item 4 - RG 1.63, Rev 1 (3/22/77), Electrical Penetration Assemblies in Containment Structures for Water-Cooled Nuclear Power Plants

Response

The criteria used in the design, construction, installation, and testing of electrical penetrations comply with RG 1.63, Rev 1, dated May 1977 with the following clarifications:

1. The single failure provision of Rg 1.63 shall apply to both Class IE and Class Non-IE overcurrent protection devices.

2. An acceptable method of compliance with the "Single Failure Criterion" of RG 1.63 may be the use of redundant or backup circuit breakers.

3. While satisfying the "Single Failure Criterion" in IEEE 279-1971, Section 4.2, the overcurrent protection devices are not required to comply with other criteria listed in IEEE 279-1971.

Item 7 - RG 1.97, Rev 1 (1/28/77), Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant Conditions During and Following an Accident.

Response

The criteria used in the design of the Post-Accident Monitoring System comply with RG 1.97, Rev 1 dated August 1977, with the following exceptions:

1. Regulatory Position C.1

   The selection of the parameters to be indicated by the post-accident monitoring system is derived from an analysis of those design basis events analyzed in Chapter 15. This parameter selection will reflect the accomplishment of a safety systems function rather than the operation of individual pieces of equipment.

2. Regulatory Position C.3

   The ranges of the post-accident monitoring system will be based on maximum design conditions combined with sufficient margin to maintain instrument accuracy and upper limit readability.

Item 9 - RG 1.105, Rev 1 (9/15/76) Instrument Setpoints

Response

Instrument setpoint requirements comply with RG 1.105, Rev 1 dated November 1976.

Item 10 - RG 1.108, Rev 1 (6/14/77) Periodic Testing of Diesel Generators Used as Onsite Electric Power System at Nuclear Power Plants

Response

The design complies with RG 1.108, Rev 1 dated August 1977.

Item 11 - RG 1.115, Rev 1 (3/22/77) Protection Against Low-Trajectory Turbine Missiles

Response

A turbine missile analysis is provided in Section 10.2.3. Combinations of such measures as care in the placement of essential systems, separation of redundant equipment, and special attention to turbine valve reliability accomplish the objective of ensuring a low risk of damage from turbine missiles.

Item 12 - RG 1.117, Rev 1 (12/20/77) Tornado Design Classification

Response

The method used for identifying those structures, systems, and components of light-water-cooled reactors that should be designed to withstand the effects of the design basis tornado, including tornado missiles, comply with RG 1.117, Rev 1 dated April 1978, with the following interpretation:

1. Paragraph 4.(4) Appendix, "Structures, Systems, and Components of Light-Water-Cooled Reactors to Be Protected Against Tornadoes" the statement:

   4. "Systems or portions of a system that are required for ...(4) mitigating the consequences of a tornado-caused PWR steamline break...."

   is interpreted as:

   Protection of systems and components for which credit is taken in the analysis of PWR steamline break outside containment.

Item 13 - RG 1.124, Rev 1 (8/31/77) Service Limits and Loading Combinations for Class 1 Linear-Type Component Supports

Response

The design limits and loading combinations for Class 1 linear-type supports comply with RG 1.124, Rev 1 dated January 1978, with the following exceptions and additions, as noted in S&W letter from S.B. Jacobs to the Secretary of the Commission, US NRC, dated June 8, 1978.

1. The following paragraph should be added to Regulatory Position C.3:

   C.3.c. The bending stress limit Fb resulting from tension and bending in structural members as specified in Appendix XVII-2214 of Section III, Div 1, should be the smaller value of 0.66 Sy or 0.55 Su for compact sections, 0.75 Sy or 0.63 Su for doubly symmetrical members with bending about the minor axis, and 0.6 Sy or 0.5 Su for box-type flexural members and miscellaneous members.

2. The second paragraph under Regulatory Position C.4 should be replaced with the following:

However, all increases (i.e., those allowed by NF-3231.1 (a) XVII-2110 (a), and F-1370 (a) shall always be limited by XVII-2110 (b) of Section III. The critical buckling strengths defined by XVII-2110 (b) of Section III should be calculated using material properties at temperature.

The increased allowable permitted for tensile stress in bolts shall not exceed the lesser of 0.70 Su or Sy at temperature. The increased allowable pemitted for shear stress in bolts shall not exceed 0.42 Su at temperature.

3. Paragraph C.5.a should be revised as follows:

   a. "The stress limits of XVII-2000 of Section III, and Regulatory Position 3 of this guide, should not be exceeded for component supports designed by the linear elastic analysis method. These stress limits may be increased according to the provisions of NF-3231.1 (a) of Section III and Regulatory Position 4 of this guide when effects resulting from constraint of free-end displacement and anchor motion are added to the loading combination."

4. Regulatory Position C.8 should read as follows:

   Supports for the "active" components that are required <u>only</u> during an emergency or faulted plant condition and that are subjected to loading combinations described in Regulatory Positions C.6 and C.7 should be designed within the design limits described in Regulatory Position C.5 or other justifiable design limits. These limits should be defined by the Design Specification and stated in the PSAR, such that the function of the supported system will be maintained when they are subjected to the loading combinations described in Regulatory Positions 6 and 7.

<u>Item 14</u> - RG 1.130, Rev 0 (7/77) Design Loading Combinations for Class 1 Plate-and-Shell-Type Component Supports

<u>Response</u>

The design limits and loading combinations for Class 1 plate-and-shell-type supports comply with RG 1.130, Rev 0 dated July 1977, with the following exceptions and additions, as noted in S&W letter from S.B. Jacobs to the Secretary of the Commission, US NRC, dated November 3, 1977.

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1. The last sentence in the first paragraph of Section B "DISCUSSION" which begins, "Component supports are deformation sensitive because...," should be deleted.

2. In paragraph B.6 "Deformation Limits," the first sentence should be revised as follows:

   Since component supports may be deformation-sensitive, satisfying the design limits of Section III will not automatically ensure their proper function.

3. In paragraph C.2.a, the first sentence should be revised as follows:

   Method 1. This method applies to component support materials whose values of ultimate strength Su at temperature are available as tabulated by their manufacturers.

4. In paragraph C.2.b, the first sentence should be revised as follows:

   Method 2. This method applies to component support materials whose values of ultimate tensile strength at temperature have not been tabulated by their manufacturers, or are not available.

5. Paragraph C.3 should be deleted in its entirety.

6. Paragraph C.4 should be revised as follows:

   Component supports, subject to the combination of the vibratory motion of OBE or the appropriate wave motion and system mechanical loadings, associated with either the Code design conditions or the normal or upset plant conditions, should be designed with the following limits:

7. Paragraph C.4.a should be revised as follows:

   The stress limits of (1) NF-3221.1 and NF-3221.2 for design condition loadings, and (2) NF-3222 for normal and upset operating condition loadings should not be exceeded for component supports designed by the linear-elastic-analysis method.

8. Paragraph C.5 should be deleted in its entirety.

9. Paragraph C.6 should be deleted in its entirety.

10. Paragraph C.7 should be deleted in its entirety.

11. Footnote 4 on page 1.130-4 should be deleted in its entirety.

12. Footnote 5 on page 1.130-4 should be deleted in its entirety.

3C.3 REGULATORY REQUIREMENTS REVIEW COMMITTEE (RRRC) CATEGORY III

Item 2 - RG 1.68.2, Rev 1 (5/16/78) Initial Startup Test Program to Demonstrate Remote Shutdown Capability for Water-Cooled Nuclear Power Plants

Response

The design complies with the remote shutdown capability of RG 1.68.2, with the following exception:

> The regulatory position implies the requirement for transfer switches. Separately fused parallel controls may be utilized in the design rather then a transfer service. The responsibility of the initial startup test program is within the scope of the Utility-Applicant.

Item 8 - RG 1.137, Rev 0 (9/27/77) Fuel Oil Systems for Standby Diesel Generators

Response

The design of fuel oil systems for standby diesel generators complies with RG 1.137 dated January 1978.

Item 10 - RG 1.141, Rev 0 (1/31/78) Containment Isolation Provisions for Fluid Systems

Response

The design complies with RG 1.141, Rev 0 dated April 1978, with the following exception:

> Regulatory Position C.3 parameters sensed (i.e., types of isolation signals) for the initiation of containment isolation are as specified by the NSSS vendor.

3C.4 NUCLEAR REACTOR REGULATORY CATEGORY IV - C

Item 6 - RSB 6.3 (6/1/77) Passive ECCS Failures During Long-Term Cooling Following a LOCA

Response

The identification and justification of the maximum leak rate are within the NSSS scope.

Detection of leakage from ECCS components outside the containment will be accomplished by monitoring the sump levels in the ESF areas, including the sump in the charging pump cubicle. Leakage collected in these sumps will be detected by instruments "sensitive enough to indicate (by alarm) operator action" to isolate the leak prior to adversely affecting other systems by flooding. System design is based on not assuming any operator action for 30 minutes prior to isolation of a leak. No adverse flooding levels result even with this 30 minute delay assumption.

Individual sumps and associated level indication instrumentation will be provided for each ECCS train in a common area. The leak detection system can thus identify an individual faulted ECCS train by location of a sump level increase.

All portions of the ECCS system outside containment are isolable either by power operated or by manual isolation valves.

Level switches and alarms will be provided to allow the operator to take the required actions discussed above.

Alarms conform with criteria specified for the control room alarms.

The level sensors and power supplies will meet the criteria enumerated in IEEE-279 with the exception that the detection system need not meet the single failure requirements.

Item 9 - RSB 5.4.6, 5.4.7, 6.3 (12/1/77) Pump Operability Requirements

Response

When such doubt arises with respect to pump operability of engineered safety feature pumps, appropriate case-by-case information will be made available.

Item 10 - RSB 3.5.1 (3/28/78) Gravity Missiles, Vessel Seal Ring Missiles Inside Containment

Response

Safety-related structures, systems, and components are protected from missiles generated internally that may result from equipment failures as required by General Design Criterion 4 (GDC 4) and as described in Section 3.5. This protection is provided by:

1. In accordance with the requirements of GDC 4, redundant safety-related equipment and components have been physically separated and barriers have been installed where required to protect against the dynamic effects of pipe whip and jet impingement.

2. The most positive method employed to prevent damage from internally generated missiles is to assure design adequacy against generation of missiles. A preliminary evaluation of plant valves, pumps, fans, and motors indicates that the design should prevent missiles from being generated (see Section 3.5).

3. As indicated in Section 3.5, in the course of the detailed plant design, potential missiles will be reviewed. Potential missile paths will be postulated and safety-related systems and components will be protected as specified in paragraph 1 above or by special localized protective shields as allowed by SRP 3.5.1.1 II.

Item 12 - PSB 8.3 (1/1/78) Degraded Grid Voltage Conditions

Response

The description of the design of the voltage sensing scheme for the onsite emergency power system is provided in Section 8.3. Periodic testing and surveillance requirements are provided in Section 16.4.6.

The design conforms with the requirements defined in the staff position, modified by the following considerations:

Position 2 - Whenever voltage setpoint and time delay limits have been exceeded, the voltage sensors will initiate: (1) the startup of the onsite power source; (2) required bus load shedding schedules; and (3) the disconnection of the offsite power source.

The automatic load shedding function (Subsequent to the undervoltage event) will be blocked when the onsite source supply breaker is closed and the preferred supply breaker opened. This block signal is not dependent on completion of the load sequencing program.

Additional load shedding and load sequencing will occur should an accident signal follow a loss of offsite power.

Item 15 - CSB 6.2.1.4 (1/1/77) Containment Response Due to Main Steam Line Break and Failure of MSLIV to Close

Response

This item will be addressed at the FDA stage or at the operating license stage for a Utility-Applicant referencing SWESSAR-P1.

Item 16 - ASB 3.6.1, 3.6.2 (11/1/77) Main Steam and Feedwater Pipe Failures

Response

This item will be addressed at the FDA stage or at the operating license stage for a Utility-Applicant referencing SWESSAR-P1.