SENSITIVE

Attachment B

Proposed Revisions to the
Updated Final Safety Analysis Report

employed ½% damping. All of the discrepancies were resolved and FSAR compliance was demonstrated.

3.9.3.1.3.4 Replacement Projects

This subsection describes the criteria and methods applied to the evaluation of piping which has replaced existing piping at the Dresden Station.

Dresden Unit 3 Recirculation Pipe Replacement

The stress analysis for Class I piping covered by the scope of the recirculation pipe replacement project was performed in accordance with ASME Section III, Subsection NB, 1980 Edition, including the Summer 1982 Addenda. To reconcile the Section III analysis with the original design code, the ASME stresses calculated were compared to the original licensing allowables, with recalculation using original rules employed only when necessary. A comparison of the maximum stresses showed that all piping met the original licensing criteria.

Safety evaluations were performed for each modification package associated with the recirculation pipe replacement project. A systematic evaluation of each design change was performed in accordance with the CECo Safety Evaluation Guidelines. No case was identified which increased the probability of occurrence or the consequences of a previously evaluated event, created an event of a different type than previously evaluated, or reduced the margin of safety as defined in the basis for any technical specification identified.

> INSERT A

3.9.3.2 Pressure Relief Devices

Discussion of reactor coolant pressure boundary pressure relief devices may be found in Section 5.2.2.

3.9.3.3 Component Supports

The following subsections discuss component pipe support design practices for the original Dresden design (Section 3.9.3.3.1), the 79-14 program (Section 3.9.3.3.2), and the Mark I program (Section 3.9.3.3.3).

3.9.3.3.1 Original Design

Piping and supports were originally designed in accordance with the USAS B31.1 Code, 1967 Edition.

The materials used in the fabrication of hangers, anchors, and supports met the requirements of USAS B31.1 Code for Pressure Piping Section 6, and the Manufacturer's Standardization Society Standard Practice MSS-SP-58 for normal operating and seismic design conditions.

INSERT A

3.9.3.1.3.5 Systems Containing Cast Iron Components

In the early 1980's, Dresden Unit 2 was part of the NRC's Systematic Evaluation Program (SEP). Under SEP Topic III-1, "Quality Group Classification of Components and Systems", the NRC reviewed the classification of structures, systems, and components of plants designed and constructed from the late 1950's to late 1960's to current appropriate classifications, codes, and standards for seismic and quality groups. Dresden Station Unit 2's safety-related systems, which were designed to the USA Standard (USAS) Code for Pressure Piping B31.1-1967 "Power Piping", were evaluated against the fracture toughness requirements of the American Society of Mechanical Engineer's (ASME) Boiler and Pressure Vessel (B&PV) Code, Section III, 1977 Edition as supplemented by the Summer 1978 Addenda. Of particular interest are the significant changes in fracture toughness requirements that occurred in 1972.

During the SEP, Dresden failed to identify that the DGCW and CCSW systems contained cast iron valves and that the CCSW system contained cast iron pump casings. The NRC was notified of this error in a letter to the USNRC dated March 31, 2000 (Letter ID PSLTR #00-0066). Because the use of cast iron in safety-related systems was not evaluated at the time of the SEP, cast iron was not addressed in the NRC Safety Evaluations regarding SEP Topic III-1. Cast iron has lower ductility and fracture toughness than other materials typically used in safety-related piping systems. Although it is an acceptable material in the USAS B31.1-1967 code, there are no material specifications for cast iron that are acceptable in the 1977 ASME Section III Code, which formed the basis of the evaluation criteria of SEP Topic III-1. To accommodate the lower ductility and fracture toughness, cast iron valve bodies and pump casings in the DGCW and CCSW systems meet the following acceptance criteria.

3.9.3.1.3.5.1 Acceptance Criteria

General

1. The CCSW and the DGCW system piping are designed to USAS B31.1, 1967 Edition.
2. All cast iron valves and the CCSW pumps meet the manufacturers specified pressure and temperature service ratings.
3. The design temperature is not higher than 400°F, and not lower than 32°F.
4. The material of the cast iron components meets ASTM Specification A 126 or A 48.
5. All cast iron valves are manually operated, and meet the ANSI B16.10 Standard.
6. The cast iron components are not used with flammable, combustible, or toxic fluids.
7. The cast iron components are not subject to water hammer or rapid thermal or pressure transients. Mechanical impact such as hammering to disassemble flanged joints is not permitted.
8. There are no pipe supports at the cast iron valves. Displacements of the cast iron components are limited such that they do not contact other components in a seismic event.
9. All cast iron components are connected to piping of wall thickness 5/8" or smaller.
10. Welding to cast iron components is not permitted.

INSERT A

Valve Nozzle Stresses

The valve nozzle stresses caused by the connecting piping end moments meet the following stress limits (see Notes, below):

Sustained Loads:
Pressure Stress + Dead Load Stress ≤ 1.0 S_{CI}

Level B Loads:
Pressure Stress + Dead Load Stress + OBE Stress ≤ 1.2 S_{CI}

Level D Loads:
Pressure Stress + Dead Load Stress + DBE Stress ≤ 2.4 S_{CI}

Thermal Expansion plus Sustained Loads:
Pressure Stress + Dead Load Stress + Thermal Expansion Stress ≤ 2.5 S_{CI}

Notes:
Definition of the stress terms is per ASME B31.1, 1989 Edition.
S_{CI} = 6.0 ksi per USAS B31.1-1967, Appendix A.
The Level D allowable is per Code Case 1606-1.
The thermal expansion plus sustained load allowable assumes fewer than 7000 thermal transient cycles. For cast iron, $S_c = S_h$.

Pump Nozzle Stresses

The pump nozzle stresses caused by the connecting piping forces and moments meet the following stress limits (see Notes, below):

Level B Loads:
General Membrane Stress ≤ 1.1 S_{CI}
General or Local Membrane Stress + Bending Stress ≤ 1.65 S_{CI}

Level D Loads:
General Membrane Stress ≤ 2.0 S_{CI}
General or Local Membrane Stress + Bending Stress ≤ 2.4 S_{CI}

Notes:
Definition of stress terms is per ASME Section III, ND-3416, 1989 Edition.
Level B general membrane stress is due to pressure, and axial forces from dead load, OBE, and thermal expansion.
Level B bending stress is due to dead load, OBE, and thermal expansion. No stress intensification factors are applied.
Level D general membrane stress is due to pressure, and axial forces from dead load and DBE.
Level D bending stress is due to dead load and DBE. No stress intensification factors are applied.
S_{CI} = 6.0 ksi.

temperature around 95°F. Brittle fracture is not a problem in this moderate temperature range.

The original specification indicates that the LPCI heat exchangers (shell side) were built to ASME Section III, Class C. The 1965 edition of the code requires impact testing. Material specification A212 has been discontinued and replaced by A515, Grade 70. Fracture toughness at the minimum heat exchanger service temperature of 51°F has been analyzed and shown to be adequate. Refer to Section 6.2.2.3.3 for additional details of this evaluation.

The HPCI drain and condensate line piping, fittings, and valves have 5/8-inch or less nominal wall thickness and are exempt from impact testing. The steam piping is over 6 inches in diameter and has a 5/8-inch or less nominal wall thickness with the lowest operating temperature exceeding 150°F. This further exempts this system from impact testing according to ASME Section III, NC 2311a9.

Note that ASME Section III, 1965 edition, provided minimum construction requirements for vessels used in nuclear power plants. It classified pressure vessels as A, B, or C. Class A vessels are equivalent to Class 1 vessels of the current code. Class B is concerned with containment vessels, and Class C is concerned with vessels used in a nuclear power system not covered under Classes A or B. System classification is addressed in the Dresden Station third interval Inservice Inspection (ISI) Plan. As noted in the plan, piping, pumps and valves were built primarily to the rules of USAS B31.1.1.0-1967, Power Piping. Consequently, the Dresden Station ISI Program does not contain any ASME Section III, Code Class 1, 2, or 3 systems. The ISI Program system classifications are based on Regulatory Guide 1.26, Revision 3, and were developed for the sole purpose of assigning appropriate ISI requirements. The ISI Program is discussed further in Sections 5.2 and 6.6.

The LPCI and core spray pumps for Dresden are Class 2 components, as described in Regulatory Guide 1.26 under Group B quality standards. The code of construction and current classification of the pumps were verified by GE.

INSERT B

Confirmation that the atmospheric storage tanks meet current compressive stress requirements was requested by the NRC. In response to this request, it was found that the standby liquid control tank was designed and analyzed based on the methodology outlined in API-650 Code specifications. However, in 1982 the tank was requalified per the then current ASME Section III, Subsection ND. It was determined that the standby liquid control tank roof cover, vessel shell, base plate, roof ring, weldment, and U-bolts met the ASME Code requirements current in 1982. The analysis also showed that the actual stresses in these components subjected to specified seismic excitations are well within the ASME Section III allowables at the design temperature of 150°F.

Reflective Metal insulation (mirror type) or nonmetallic insulation (Nukon Blanket, foam glass or closed cell foam plastic) installed on piping inside the containment meets the requirements as defined in Section 5.2.3.2.3, "Compatibility of Construction Materials with External Insulation and Reactor Coolant". Therefore, the potential for stress corrosion cracking due to the presence of leachable chlorides in nonmetallic thermal insulation is not a concern.

INSERT B

The DGCW and CCSW systems contain cast iron valves. Additionally, the CCSW pump casings are made of cast iron. Because the use of cast iron in safety-related systems was not evaluated at the time of the NRC Systematic Evaluation Program (SEP), cast iron was not addressed in the NRC Safety Evaluations regarding SEP Topic III-1. Cast iron has lower ductility and fracture toughness than other materials typically used in safety-related piping systems. Although it is an acceptable material in the USAS B31.1-1967 code, there are no material specifications for cast iron that are acceptable in the 1977 ASME Section III Code, which formed the basis of the evaluation criteria of SEP Topic III-1. To accommodate the lower ductility and fracture toughness, cast iron valve bodies and pump casings in the DGCW and CCSW systems meet the acceptance criteria described in Section 3.9.3.1.3.5.1.

Table 6.1-1 (Continued)

FRACTURE TOUGHNESS REQUIREMENTS

Structures, Systems, and Components	Quality Group Classification[1]	Material	Impact Test Required?	Reason for Exemption[2]	Remarks
Core Spray System					
Pump casing	Class B	ASTM A216, Gr. WCB carbon steel	Yes		Thickness up to 13/16 in.
All carbon steel piping	Class B	ASTM A106, Gr. B[7]	No	8a	
Valves and fittings	Class B	carbon steel	No	8a	
All stainless steel piping, fittings, valves	Class B	Type 304	No	8a,e	
Spray spargers and spray nozzles	Class B	Type 304 stainless steel	No	8e	
Low Pressure Coolant Injection/ ~~Containment Coolant Subsystem~~					
Pump casing	Class B	ASTM A216, Gr. WCB carbon steel	Yes		Thickness up to 13/16 in.
All Stainless steel piping, fittings, valves	Class B	Type 304[9]	No	8e	
All carbon steel piping	Class B	ASTM A106, Gr. B	No	8a	
Valves and fittings	Class B	carbon steel	No	8a	
Containment Cooling Service Water					
Pump Casing	Class C	ASTM A126, Class B	No	8a	
All carbon steel piping	Class C	ASTM A106, Gr. B	No	8a	
Carbon steel valves and fittings	Class C	carbon steel	No	8a	
Cast iron valves	Class C	ASTM A126, Class B	No	8a	

Table 6.1-1 (Continued)

FRACTURE TOUGHNESS REQUIREMENTS

Carbon steel

Structures, Systems, and Components	Quality Group Classification[1]	Material	Impact Test Required?	Reason for Exemption[2]	Remarks
Standby Diesel-Generator System					
Service water piping	Class C	ASTM A106, Gr. B	No	8a	
Valves and fittings	Class C	Carbon steel	No	8a	
Cast iron valves	Class C	ASTM A126, Class B	No	8a	
Fuel oil piping	Class C	ASTM A53, Gr. B	No	8a	
Valves and fittings	Class C	Carbon steel	No	8a	

Notes:

1. The quality group classification given here is the Regulatory Guide 1.26 classification to determine fracture toughness testing requirements and should not be confused with safety classification. Refer to Section 3.2 for a discussion of safety classifications.
2. Refer to Tables A4-4 — A4-6 of Appendix A in Franklin Research Center report on quality group classification of components and systems for explanation of exemptions.
3. Applies to drain and condensate piping.
4. For piping 2" and under, ASTM A335 Grade P11 or P22 may be substituted for ASTM A106 Grade B material for the same schedule. For fittings and valves 2" and under, ASTM A182 Grade F11 or F22 may be substituted for ASTM A105 for the same rating. Substitutions are allowed up to a maximum temperature of 450°F (operating or design).
5. Piping replacement on Unit 3 changed the piping material to type 316 stainless steel.
6. A portion of the Unit 3 isolation condenser return line was replaced with type 316 stainless steel.
7. A portion of the piping from outboard valves 2-1402-24A/B to the reactor vessel safe end (Unit 2) was replaced with carbon steel SA333, grade 6 under M12-2-75-39.
8. Some of the CCHX tubes have been replaced by A1-6XN alloy tubes.
9. A portion of the LPCI discharge, inboard from the outboard isolation valve, was replaced with type 316 (special chemistry) stainless steel.
10. A portion of the system is fabricated from A106, grade B carbon steel.
11. Material type A106, grade B is the preferred material with A53, grade B as an acceptable substitute when A106 is not available.