6.2 DESIGN BASIS

The ESF system components are procured to detailed engineering specifications and tested to codes listed in the following sections. The double-ended rupture of the largest reactor coolant pipe is designated as the design basis accident (DBA), since the forces and thermal phenomena affecting the core are the most severe. The maximum post-accident containment temperature, pressure and humidity in the Containment will ordinarily be developed by the loss of coolant that occurs with a somewhat smaller break. A discussion of the analyses performed for a spectrum of break sizes, to determine these limiting service conditions, is presented in Sections 14.17 and 14.20.

All components of the ESF system and associated critical instrumentation are designed to operate in the most severe environment to which they could be exposed in the event of a LOCA. These design requirements are of primary significance for those portions of the ESF system which are located inside the Containment Structure, including piping, valves, filters, cooling coils, instrumentation, electrical wiring and motors. This equipment is designed to operate in the containment design atmosphere of 50 psig, 276°F (maximum concrete temperature), 100% relative humidity and 10^8 rads in the year following the accident. NOTE: All safety-related equipment in the containment have been evaluated for the revised maximum vapor temperature contained in Section 14.20.

Portions of the Safety Injection System are ASME Class 1, and thus require a fatigue analysis of the applicable thermal shock transients, and other operational cycles. In addition to design cyclic transients a, d, and e of Section 4.1.1, the Safety Injection System fatigue analysis considers the injection of cool safety injection flow into the RCS at various RCS pressures and temperatures. See Reference 1 for further details, including the allowed number of injection transients and the assumed operating conditions of these transients.

Sections 14.13, 14.14, 14.17, and 14.26 postulate those accidents that could result in the combined radiation, high temperature, pressure, and humidity environment. Other accidents discussed in Section 14.0 do not require safety-related electrical and mechanical equipment and components to function in an environment other than the normal environment.

For those accidents not resulting in a combined high radiation, temperature, pressure and humidity environment, the electrical and mechanical systems which must function are discussed in the appropriate subsections of 14.0 and the systems are further delineated in the applicable sections of the Updated Final Safety Analysis Report (UFSAR).

For a list of all equipment and components, including those outside of the containment and not exposed to the LOCA environment, refer to Figure 7-10 (Engineered Safety Features Actuation System Logic Diagram).

The solenoids and motor operators for containment isolation valves within the containment which are required to operate following a LOCA will be qualified for maximum LOCA environmental conditions.

The forces generated by the maximum hypothetical earthquake, combined with the rupture of a reactor coolant pipe, are considered in the design of the ESF. The design ensures the functional capability of the system will be retained. Vessels which are connected to the ESF systems are supported and restrained to allow controlled movement during this load condition, and piping is designed to accept these imposed movements. Engineering calculations of the flexibility of the systems have been performed to verify that the piping can accept these additional vessel movements and still remain within code allowable limits of stress. Flexibility calculations have been performed according to the Code of Pressure Piping, American National Standards Institute (ANSI) B31.7. These systems also have been designed to minimize the effects of water hammer through pipe layout, support selection and support location. Supports

and hydraulic snubbers are designed to withstand the loads which could result from the quick closure of valves.

6.2.1 REFERENCES

1. Bechtel Specification 6750-M-0310B, "Design Specification for Piping, Valves, and Associated Equipment of the Safety Injection System"