

ENCLOSURE

SEQUOYAH NUCLEAR PLANT UNITS 1 AND 2 PIPE RESTRAINT STRUCTURAL STRAND TEMPERATURE 10 CFR 50.55(e) FINAL REPORT

Description of Condition

The pipe restraints involved are pipe whip restraints provided for the 37-inch O.D. crossover pipes between the reactor coolant pump and the steam generator in each Reactor Coolant System (RCS) loop. Each restraint (see attached sketch) consists of a pair of floor mounted pedestals, one under each pipe elbow at the ends of the relatively short run of horizontal pipe. The elbows point vertically upward. The pedestals are restrained from moving apart by two 2-7/8-inch structural strands which form loops around both pedestals. The pedestals are positioned such that the RCS piping, when hot, has a 1/8-inch gap with the upper strand (socket) on the outboard side; and when cold, has a similar gap on the inboard side. This configuration leaves a minimal space for thermal insulation between the strands and the pipe. The metallic insulation for each crossover leg was therefore designed to house both the pipe and the structural strands. This would result in the strands reaching a temperature near the RCS operating temperature. The strand material is carbon steel with a galvanized coating, which presented a problem since at the RCS operating temperature, the zinc galvanizing would diffuse into the steel, causing embrittlement. The strands, therefore, might fail under loss of coolant accident (LOCA) conditions.

Safety Implications

The plant safety evaluation in the FSAR assumes the structural integrity of the RCS under design conditions, including a single double-ended pipe rupture in a crossover leg. Failure of the crossover leg restraint is not postulated in the FSAR, and is an occurrence which could jeopardize the functioning of other safety-related components. Such failures coincident with a LOCA are not provided for in the plant design.

Corrective Action

Field measurements have been made during hot functional testing of the RCS, to verify the clearances between the piping and the structural strands, and to check the strand temperatures. At the time these measurements were made, there was not thermal insulation between the crossover pipe and the strands. At a

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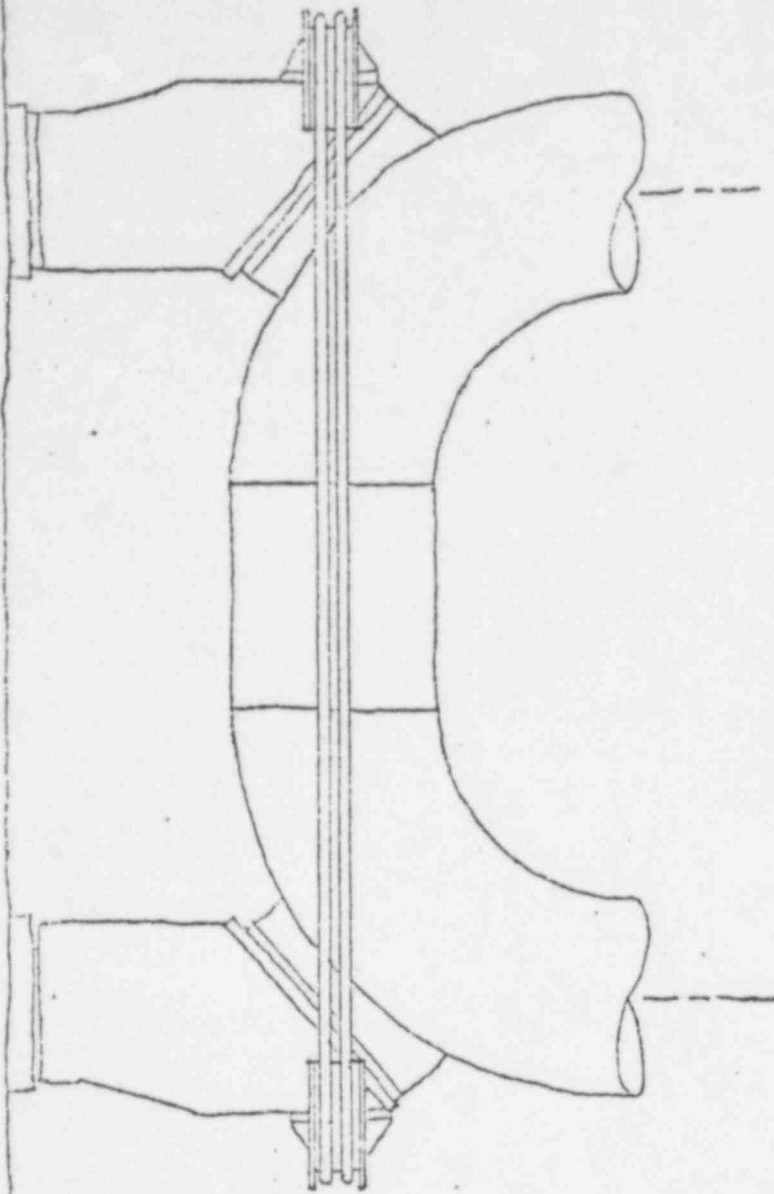
reactor coolant temperature of 547° F (design steam generator outlet temperature is 545.5° F), the highest strand temperatures were 235 to 250° F, with most temperatures in other strand areas being about 160° F.

The pipe thermal insulation is being redesigned to provide a horizontal V-notch configuration in the areas where the strands are in close proximity to the pipe. The insulation between the pipe and the strands will consist of a sheet metal baffle which will be sufficient in view of the temperature measurements made with no insulation, discussed above. The V-notch will permit natural circulation cooling of the strands by the ambient air. The corrective action will be completed before fuel loading for each of the plant units, respectively.

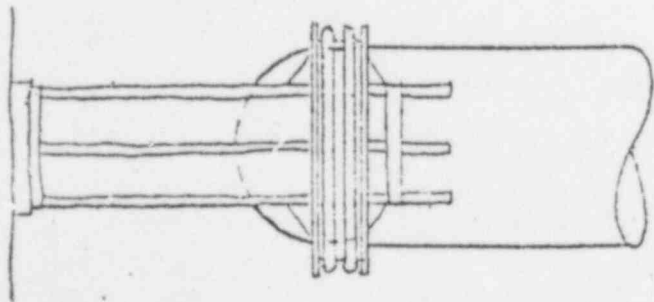
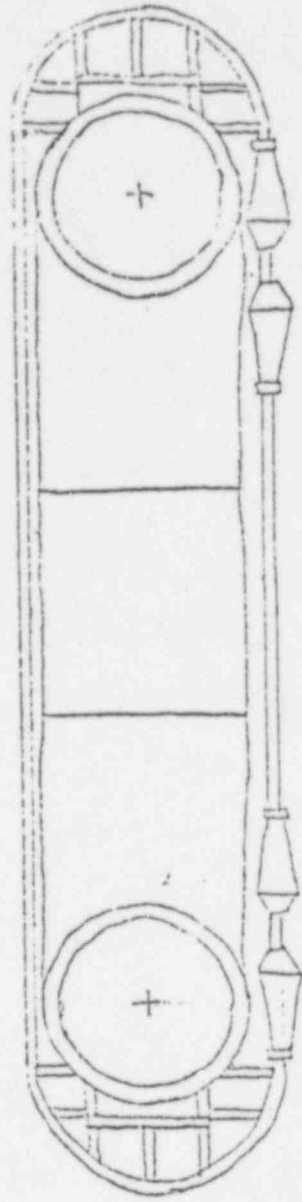
Sequoyah Nuclear Plant is the only plant in the United States to utilize the structural strand restraint design.

2238 253

ELEVATION



PLAN



POOR ORIGINAL

2238 254

CROSSOVER PIPES - PIPE WHIP RESTRAINTS