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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Second Interim Report Concerning
Reactor Vessel Temporary Full Flow Filters

On April 6, 1987, Houston Lighting & Power notified the NRC, pursuant to 10CFR50.55(e), of an item concerning the failure of the reactor vessel temporary full flow filters. Enclosed is the second interim report on this item. Our next report will be submitted by June 12, 1987.

If you should have any questions on this matter, please contact Mr. C. A. Ayala at (512) 972-8628.

J. H. Goldberg
Group Vice President, Nuclear

MJB/hg

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South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Second Interim Report Concerning
Reactor Vessel Temporary Full Flow Filters

I. Summary

On April 6, 1987 Houston Lighting & Power Company (HL&P) notified the NRC of an item concerning the failure of the reactor vessel temporary full flow filters. When the reactor vessel internals were removed a number of filters installed during startup testing were found to be damaged with all or part of the wire mesh screen material missing from the filter assembly. The potential exists for missing filter screen material to be distributed within the reactor coolant system (RCS).

II. Description of Deficiency

When the reactor vessel internals were removed after hot functional testing of Unit 1, approximately fifty-seven (57) of 192 Westinghouse supplied temporary full flow filters located at the bottom of the lower internals were found to be damaged. All the wire mesh screen material is missing on four (4) assemblies. Part of the wire mesh is missing on twenty (20) assemblies and pieces of wire are missing on thirty-three (33) assemblies. These temporary filters were used during hot functional testing to improve the cleanliness of the RCS and interfacing systems as a complement to normal flushing and to simulate the pressure drop across the core. These filters were removed from the reactor core after hot functional testing.

The STP filters were supplied by Westinghouse and their design is based on a French design (Framatome) for use in plants with fourteen foot cores (XL plants).

III. Corrective Action

The first phase of the corrective action program was to gather and analyze available data to establish the weight of the missing screen material. This process is described on the addendum to this report.

The second phase, now in progress, is the detailed inspection of the reactor coolant and interfacing systems for failed screen material. Included in this program are the reactor coolant system (RCS), reactor vessel head and vessel internals, steam generator channel head and tubes, the pressurizer, control rod guide tubes, chemical volume and control system (CVCS), boron thermal regenerative system (BTRS), residual heat removal system (RHRS), and liquid waste processing system. The inspection program has been expanded to include RCS branch lines (safety injection accumulator lines and pump injection lines) and the pressurizer spray line. These inspections are targeted for completion by June 10, 1987.

Based on the maximum weight (95% confidence level) of the missing screen material, to date, 76% of the material has been recovered in the following components: reactor vessel, upper internals, BMI tubes, RHR heat exchangers, pressurizer, and steam generator hot leg channel heads and tubes. Westinghouse has developed acceptance criteria to evaluate the acceptability of screen material, if any, which is not recovered in these inspections. This includes a safety evaluation to demonstrate that unrecovered material does not constitute a threat to the safe and reliable operation of the plant.

IV. Recurrence Control

The project, in conjunction with Westinghouse, has evaluated the damaged screens to determine the root cause of the screen failures. The results of metallurgical examination indicate that the failure was caused by high-cycle fatigue (fluid elastic vibration of the screen wires) apparently due to inadequate brazing of the screen wires. Recurrence control measures for the Unit 2 filters are being evaluated.

V. Safety Analysis

The safety analysis will be provided in the Final Report.

ADDENDUM

The following steps were taken to establish the weight of the missing screen material:

1) The undamaged screen assemblies were weighed individually. (135 total screens)

2) Lengths of wire missing from screens with minor damage (33), i.e., missing only one piece of wire, were measured. These screens were weighed and the weight for missing wire lengths were added to simulate undamaged screens.

3) The weights of the 168 screens (from steps 1 and 2) were statistically analyzed to establish the mean of one screen (120.2 grams) and standard deviation of screen weights from the mean (3.33 grams).

4) The maximum screen weight (at a 95% confidence level) was then calculated:

$$\text{max screen weight (95\% confidence level)} = 120.2 + \frac{Zo\ (3.33)}{\sqrt{N}}$$

$$\text{max screen weight} = 120.2 + \frac{(1.65)\ (3.33)}{\sqrt{24}}$$

$$= 121.32 \text{ grams}$$

5) The value for the maximum weight of the remaining 24 screens (at a 95% confidence level) was then established. (121.32 grams per screen X 24 - 2911.68 grams)

6) The weight of the intact portions of the 20 screens with pieces of mesh screen missing was subtracted from the value obtained in step 5 to establish the maximum weight (at 95% confidence level) of the missing material. (866.78 grams)

7) The weight of the material recovered to date was then compared to the value for missing material from step 6 to establish the percentage of missing material recovered to date. (76%)

We have elected to evaluate the percentage of material recovered (step 7) against a conservatively established maximum value of missing material (step 6).