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January 15, 1985
ST-HL-AE-1168
File No.: G12.188

Mr. Robert D. Martin
Regional Administrator, Region IV
Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
Arlington, TX 76011

RECEIVED
JAN 18 1985

Dear Mr. Martin:

South Texas Project
Units 1 & 2
Docket Nos. STN 50-498, STN 50-499
Second Interim Report Concerning
Containment Spray pH

On September 21, 1984 Houston Lighting & Power Company informed the Nuclear Regulatory Commission of a reportable deficiency pursuant to 10CFR50.55(e) concerning spray pH levels that exceed equipment qualification limits. Attached is the second interim report on this item. HL&P will transmit the next report on this deficiency by April 22, 1985.

During the review of this issue it was determined that during a certain scenario it was possible to develop a low pH problem that could result in exceeding 10CFR100 dose limits. The design changes identified in this report will address both the high and low pH problems. This issue will be closed pending completion of the offsite dose calculations required as a result of the design changes.

If you have any questions concerning this matter, please contact Mr. Michael E. Powell at (713) 993-1328.

Sincerely,

G. W. Oprea, Jr.
Executive Vice President

SMH/cg

Attachment: Second Interim Report Concerning
Containment Spray pH

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South Texas Project
Units 1 & 2
Docket Nos. STN 50-498, STN 50-499
Second Interim Report Concerning
Containment Spray pH

I. Summary

On August 7, 1984, Westinghouse informed Bechtel that the present containment spray system design cannot maintain the spray pH less than 10.5 under all conditions. The pH value of 10.5 is the upper limit on the design bases for the South Texas Project (STP) containment spray system (CSS). The basis for equipment qualification of non-Westinghouse equipment for chemical spray is a pH range of 8.5 and 10.5. The Westinghouse WCAP 8587, "Methodology for Qualifying Westinghouse WRD Supplied NSSS Safety Related Electrical Equipment," includes a specification of 10.5 pH for chemical spray environmental qualification.

The consequence of this condition if left uncorrected is that the environmental qualification envelope for safety-related equipment inside containment would be exceeded.

During the design review to correct this deficiency it was determined that under other conditions a low pH and resulting offsite dose problem could exist. The design fixes described herein will correct both the high and low pH problems.

II. Description of Deficiency

On August 21, 1984, Houston Lighting & Power Company (HL&P) notified the NRC Region IV that the above item concerning the inability of the current CSS to maintain the pH less than 10.5 had been determined to be potentially reportable persuant to 10CFR50.55(e). This item was discovered during a review of the CSS design.

Westinghouse has indicated that inappropriate modeling used in the analysis of containment spray pH for the South Texas Project was the source of this design deficiency. Specifically, during the recirculation phase, sodium hydroxide is still being added to the containment spray flow from the Spray Additive Tank. This sodium hydroxide, coupled with the additive already contained in the containment sump (which is being recirculated), determines the spray pH. The Westinghouse calculation neglected sodium hydroxide present in the sump in calculating recirculation mode spray pH. Modified calculations performed by Westinghouse indicate that the present system could allow the spray pH to be as high as 12.0 during the recirculation phase. The consequence of this deficiency if left uncorrected is that equipment qualification chemical environment limits for equipment inside containment would be exceeded.

Further evaluation of the existing system under assumptions which maximize calculated offsite doses identified a concern that 10CFR100 offsite dose limits may be exceeded using current analytical methods. The following design conditions contribute to this result. First, the spray additive eductors employed on STP are not designed to function at motive fluid temperatures exceeding 160°F, a condition which may exist during the early portion of the recirculation phase. Spray pH is assumed equal to sump pH during this period. Spray pH could be as low as 7.8 with conservative assumptions. Second, the CSS discharge piping arrangement will result in a low spray pH in one of the two spray risers in the event of a single failure of a spray additive tank isolation valve to open. As a result, spray pH on one side of the containment may be as low as 7.7 during the injection phase. Using current analytical methods, which require consideration of iodine re-evolution due to low sump pH (below 8.5), calculated offsite doses for the above described conditions may exceed 10CFR100 limits.

III. Corrective Action

The corrective action for high recirculation phase spray pH is to isolate the spray additive tanks at the end of the injection phase. The corrective action to ensure that offsite doses do not exceed 10CFR100 limits is to provide a sump additive tank that directs NaOH to the containment floor at switchover from the injection phase to the recirculation phase.

Direct addition of NaOH to the floor of containment will ensure that the containment sump pH, which becomes the spray pH during the recirculation mode, is high enough to meet design objectives of removal of iodine from the post-accident containment atmosphere and subsequent retention of iodine in the containment sump. Isolation of the spray additive tanks at the end of the injection phase ensures that high spray pH will not occur during the recirculation phase. This remains true in the event of a single failure of a spray additive tank isolation valve to close.

Implementation of these design changes will ensure that spray pH will be maintained less than 10.5 during the entire injection and recirculation phases, satisfying the existing equipment qualification limits for equipment located inside containment. In addition, calculated offsite doses are expected to meet 10CFR100 limits.

IV. Recurrence Control

An isolated error in the analysis of containment spray pH by Westinghouse has been identified as the cause of the deficiency. Therefore, no recurrence control is required.

V. Safety Analysis

The environmental qualification of equipment would be suspect if this situation were left uncorrected since, with the current design, the environmental qualification parameters specified for chemicals would

be exceeded. Safety-related equipment (non-Westinghouse) has been qualified for a pH range of 8.5 to 10.5. Westinghouse supplied safety-related electrical equipment has been qualified to a pH of 10.5.

Since the pH range falls outside the environmental qualification range for safety-related equipment, it is assumed that unless corrected a safety hazard would exist and that the condition is reportable under 10CFR50.55(e). In addition 10CFR100 dose limits may not be met for the low pH range.