BOSTON EDISON COMPANY
GENERAL OFFICES 800 BOYLSTON STREET
BOSTON, MASSACHUSETTS 02199

A. V. MORISI
MANAGER
NUCLEAR OPERATIONS SUPPORT DEPARTMENT

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Mr. Thomas A. Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

License No. DPR-35
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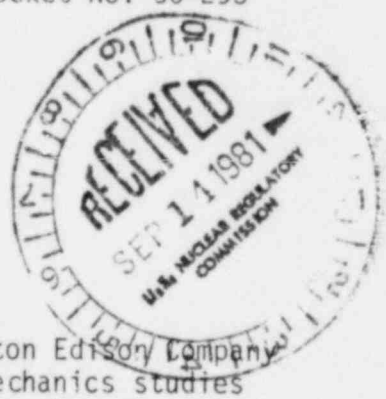

Subject: Core Spray Sparger Plans for Pilgrim Station

Dear Mr. Ippolito:

In a meeting at your offices on July 30, 1981, Boston Edison Company presented the results of stress analyses and fracture mechanics studies which enabled us to make the determination that operation through cycle six (6) with the existing Core Spray Sparger is acceptable. The attachment to this letter provides you with our plans for sparger inspection including acceptance criteria to be used in determining core spray operability.

As stated in the referenced meeting, it is Boston Edison Company's position that the Pilgrim Station CSS is fully operational and that the system will continue to provide adequate emergency core cooling. Also, based upon service load analysis, experimental and theoretical residual stress and crack growth data, fracture mechanics and stress analysis indicate structural integrity will remain intact throughout fuel cycle 6. Since the cause of cracking has not been determined, those analyses will be refined based upon crack growth characteristics measured during the September 1981 sparger inspection.

Based upon the above discussion, we do not believe this issue is a safety concern . ALARA considerations alone therefore do not justify changeout at this time. Instead, our immediate plans call for a more in depth inspection during the 1981 refueling outage (Sept. 1981), and with the results of these improved inspection techniques, establish a data base to apply to any causative findings identified by the destructive tests to be performed on the Oyster Creek CSS (Spring 1982).

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Should you require any further information or clarification as a result of your review of the attached material, please do not hesitate to contact us. Copies of procedures when put into effect will also be available upon your request.

Very truly yours,

ATTACHMENT A

Planned Inspections

The 1980 Refueling Outage inspection of the reactor internals utilized requirements established in accordance with ASME Boiler and Pressure Vessel Code, Section XI 1974 Edition. This required visual examination as a part of the inservice examination requirements in order to provide a report of the general condition of the reactor pressure vessel internals. The purpose of this inspection was to observe if conditions existed such as wear, cracks, corrosion or erosion on the surfaces, or misalignment or movement of the internals. The areas examined included the major load bearing elements of the reactor internals which are relied upon to retain the core structure in position, the lateral, vertical, and torsional restraints within the reactor vessel, the locking and bolting devices whose failure could adversely affect the structural integrity of the internals, surfaces that are known to be or may become contact surfaces during operation, and the locations on the reactor internal components identified from the vibration analyses as critical, and the interior of the reactor vessel for evidence of loose parts or foreign material.

For the Core Spray Sparger a remote visual technique was used via TV cameras. Illumination of the areas was provided at right and oblique angles to expose any cracks or evidence of corrosion or erosion. Resolution criteria was considered adequate when the combination of lighting and observed angles could resolve a black line 1/32 inch-wide, on an 18% neutral grey card placed on the surface being examined or a simulation thereof.

All examinations were performed by "certified" level III technicians.

Our planned inspection of the Core Spray Sparger during the 1981 outage will incorporate all the techniques used for our 1980 inspections plus the more stringent requirements specified by IE Bulletin #80-13 "Inspection Requirements for Core Spray Spargers" (i.e. 1/MIL Wire for resolution acceptance criteria).

In addition, we have purchased a stand on which both camera and lighting will be rigidly mounted. This will eliminate any possibility of sway, which can be a hindrance if using free hanging equipment.

The linear indications identified during the 1980 ISI shall form the base line from which additional indications will be evaluated. Image enhanced photographs taken from video tape records will be used for this purpose. It is essential that these reference indications be established for determining the rate of flaw growth. In order to achieve this goal with some degree of confidence and accuracy, approximately 6 reference indications will be identified for thorough examination during the 1981 ISI. Inspection techniques will be such that flaw length and width can be later measured.

Since the quality of the 1981 ISI will be greatly improved and computer image enhancement information will be available, it is expected that the extent of the observed linear indications can be quantified within approximately 180° of the exposed surface. Accordingly, previously undetected or recently formed indications may be identified and evaluated.

Comparison of 1981 ISI results to 1980 reference indications will provide improved fracture mechanics evaluation basis for flaw growth. The recent work by APTECH will be refined to include these data for flaw growth and arrest predictions for Cycle 6.

Planned Maintenance

Maintenance action decisions will be made on a case by case basis and will be dependent upon the ability to reliably predict flaw growth rate for Cycle 6.

External sparger pipe clamps shall be designed so as to satisfy "full operability" requirements upon installation. The circumstances under which clamps will be installed over an identified crack in a local region on the sparger or jumper pipe are as follows:

- In the event that crack arrest is not predicted for a given crack.

- In the event that circumferential cracks are observed or predicted to extend from over the top to under the bottom. (Since it cannot be demonstrated by visual inspection methods that cracking does not continue around the backside of the pipe, a 360° crack will be assumed.)

- In the event that sparger design function and operability criteria are exceeded.

  The maximum allowable bypass flow through the cracks will be 10%. This is based on a calculated 20% margin which now exists on design flow capability. The maximum allowable momentum flow from cracks between adjacent nozzles must be less than the sum of the momentum flows of the two adjacent nozzles. This is based on GE topical report NEDO-20566-3 (LOCA analysis per 10 CFR 50 App. K). Flow through the cracks will be adjusted by clamps if it exceeds these criteria.

  If cracks are found for which a calculation shows it will circumnavigate the nozzle, we will clamp the nozzle in place.

Based upon present engineering knowledge, including empirical data and analytical model results, we do not predict or forsee any situation where the application of clamps will not provide a sound engineering fix. Clamping where warranted in local areas is considered to be the primary fix and the need for sparger replacement is not anticipated. However, the sparger will be replaced if it is determined that the spray distribution/heat transfer portion of the core spray system has been lost due to mis-directed flow and the need for spray distribution/heat transfer can be demonstrated.

Scheduling

- Sparger inspection procedures will be in place by Sept. 15, 1981.

- Procedures to direct the clamping operation will be in place by Oct. 1, 1981.

- Procedures to direct the replacement effort will be in place by Oct. 1, 1981.

- Boston Edison Company in conjunction with General Electric Company and G.P.U. Nuclear has been developing a program replete with procedures for replacement tooling and sparger. This program will be completed in Mid-October, 1981.

- Should clamping be determined as necessary, an organization (B.M.K.) with fully trained individuals that have performed this task at other facilities will be utilized. This contract agreement is already in effect.

- Should it become necessary, Boston Edison Company and General Electric Company have developed a contingency in which G.E. will immediately initiate a pre-established training program for their technicians and engineers. This training program requires three weeks at the G.E. Training Center in San Jose, CA.

- For a single clamp; when the determination is made that a clamp is necessary, the installation time after measuring and fabrication would be seventeen (17) days.

- Sparger replacement would require approximately sixty-five (65) days of in vessel time.

Dose Projection

Approximately two (2) man-rem exposure would be utilized to measure and install one clamp. Sparger replacement would require three hundred (300) man-rem. To procedurally reduce this exposure, all work will be performed with the reactor vessel flooded to the flange level and work would be performed from a platform mounted on the flange. The reactor cavity walls will be pre-and-continually deconned to an acceptable ALARA level.

ECCS Reliability

The function of the core spray system is to provide accident mitigation by delivering a spray of water into the upper plenum providing both reflood inventory and core spray heat transfer cooling to the fuel bundles prior to core reflood.

Since the pumps, valves and piping external to the inside of the shroud are unchanged, water is delivered as in the original design and reliability of the overall system and reflood capability remains unimpaired.

Spray water delivery to the upper plenum which provides core spray heat transfer cooling also remains unimpaired. The reduced MAPLHGR limits used in the Cycle 5 analysis are extremely conservative since, in addition to the heat transfer allowed by Appendix K, they neglect the many contributing factors to peak clad temperature margins which exist at Pilgrim Station such as upper tie plate counter current flow limiting (CCFL) breakdown with earlier reflood, side entry orifices, bypass leakage, decay heat, and film boiling correlation.

Cycle 5 MAPLGHR limits are extremely conservative and could be restored to the original values for Cycle 6 if justified by the forthcoming inspection.