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UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

MAY 13 1980

MEMORANDUM FOR: Those on Attached List

FROM: Helen Pappas, Chief, Administrative Branch

SUBJECT: IE BULLETIN NO. 80-13

The attached IE Bulletin No. 80-13 titled "Cracking in Core Spray Spargers" was sent to the following licensees on May 12, 1980 for action and information:

ACTION

Commonwealth Edison Company
Dresden 1, 2, 3 (50-10, 50-237, 50-249)
Quad-Cities 1, 2 (50-254, 50-265)

Consumers Power Company
Big Rock Point (50-155)

Dairyland Power Cooperative
LACBWR (50-409)

Iowa Electric Light & Power Company
Duane Arnold (50-331)

Northern States Power Company
Monticello (50-263)

INFORMATION

Cleveland Electric Illuminating Company
Perry 1, 2 (50-440, 50-441)

Commonwealth Edison Company
La Salle 1, 2 (50-373, 50-374)

Cincinnati Gas and Electric Company
Zimmer (50-358)

Detroit Edison Company
Fermi 2 (50-341)

Illinois Power Company
Clinton 1, 2 (50-461, 50-462)

Northern Indiana Public Service Company
Bailly (50-367)

Helen Pappas

Helen Pappas, Chief
Administrative Branch

Enclosure: IE Bulletin
No. 80-13

Addressees - Memorandum dated May 13, 1980

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

May 12, 1980

IE Bulletin No. 80-13

CRACKING IN CORE SPRAY SPARGERS

Description of Circumstances:

Instances of cracking in core spray spargers have occurred at two BWR facilities. This trend indicates a need for more intensive inspection of these components during subsequent refueling outages.

Oyster Creek Nuclear Generating Station

Jersey Central Power and Light Company notified the NRC on October 18, 1978, that a crack had been found in Core Spray Sparger System II during remote visual inservice inspection at their Oyster Creek Nuclear Generating Station. The crack was located at 208° azimuth and extended at least 180° circumferentially around the sparger. An evaluation of the event by the licensee postulated that deformation of the sparger had occurred during fabrication and installation which led to cracking by Intergranular Stress Corrosion Cracking (IGSCC) during service in the BWR environment. A temporary repair was effected by installing a clamp assembly over the crack. The licensee's analysis indicated that the crack had relieved the stresses present and therefore precluded further cracking. The NRC safety evaluation permitted operation until the next refueling outage and required inspection of the sparger at that time.

The NRC was informed by the Jersey Central Power and Light Company on January 16, 1980 that further cracking was discovered in the core spray spargers during an inservice inspection conducted in conjunction with the refueling outage. A total of twenty-eight cracks 0.001 to 0.002 inches in width and of varying lengths were identified in both core spray spargers. The licensee stated that they believed the majority of additional cracks were present earlier and not discovered during the 1978 inspection due to inspection equipment limitations. Near term repair consisted of the application of nine additional clamp assemblies in areas of the spargers where cracks were visually observed on the accessible portion of the sparger and UT indications were present in the inaccessible portion of the sparger and in the junction box region. The licensee analyzed the flow characteristics of the spargers and determined that adequate flow distribution would be maintained if thru wall cracking .005 inches wide and 180° in length were present. The licensee stated that the installation of the clamps would assure the sparger would maintain its physical integrity and remain in place.

The repair measures proposed were determined by the NRC to be adequate until the following refueling outage. The NRC evaluation stated that actions should be taken to develop and install an improved replacement system at the following refueling outage.

Pilgrim Nuclear Power Station

On January 31, 1980 the Boston Edison Company (BECo) informed the NRC that five indications in the upper core spray sparger and two indications on the lower core spray sparger at the Pilgrim Nuclear Power Station were identified during remote visual inservice inspections. The indications were confirmed as cracks after hydrolasing and brush cleaning. The licensees evaluation indicated that the sparger will retain structural integrity throughout the next cycle, although core spray flow distribution may be affected due to through-wall cracks. However, core spray flow delivery to the shroud interior would not be expected to decrease. A loose parts analysis was presented which addressed (1) corrosion, (2) flow blockage, and (3) control rod interference.

To support power operation in Cycle 5 with the core spray sparger in its present condition, BECo has reanalyzed ECCS taking credit only for core spray reflood, taking no credit for core spray heat transfer. The submission by BECo is currently under review by the staff. The analysis is expected to cover a full spectrum of core spray failures. It is expected that the limiting condition will be the failure of recirculation suction line. A MAPLHGR limit reduction will likely be imposed during Cycle 5 to compensate for the assumption of no core spray heat transfer.

Based on results from other sparger inspections and previous pipe cracking experience, cold work and sensitization during fabrication and installation stresses are considered to be the major factors in causing the observed cracks at the Pilgrim Station. The cracks are hypothesized to be initiated and propagated by intergranular stress corrosion (IGSCC).

A meeting was held with representatives from GE in Bethesda, Maryland on March 13, 1980 to discuss core spray sparger cracking at BWRs. At the meeting GE provided the following information:

1. In February 1979, GE issued to BWR licensees Service Information Letter (SIL) No. 289 that recommended inspection of the core spray spargers for visual indications of cracking. To date, 19 of 21 plants inspected have no observed cracking. Cracks have been found at 2 facilities (Pilgrim and Oyster Creek).

2. The key contributors to IGSCC vary from plant-to-plant, although stresses from cold work and sensitization during fabrication and installation are considered prime factors leading to IGSCC at Pilgrim and Oyster Creek. Because the cause of cracking is not yet confirmed by metallurgical analysis, GE is developing tooling to extract sparger samples to verify the postulated cracking mechanism.

3. GE is evaluating methods of improving the sparger inspection techniques, and is considering a modification to the SIL, if warranted.

The staff agreed that improved inspection techniques should be developed and metallurgical examinations should be performed to determine the mode of failure. The staff asked GE to keep them informed of progress in these areas.

Actions to be Taken by Licensees:

For all boiling water power reactor facilities with an operating license:

1. At the next scheduled and each following refueling outage until further notice, perform a visual inspection of the Core Spray Spargers and the segment of piping between the inlet nozzle and the vessel shroud. Remote underwater TV examinations are acceptable if adequate resolution can be demonstrated. The viewing in situ of 0.001 in. diameter fine wires is considered as an acceptable means of demonstrating suitable resolution of the TV examinations. Such techniques as the use of oblique lighting, and the ability to light from each side independently are considered useful in enhancing the image of cracks to facilitate detection.

2. In the event cracks are identified during examination of the core spray sparger system, the location and extent of the indications shall be recorded and reported to the NRC. Supplementary examinations using volumetric methods may be performed to aid in characterizing the extent of cracking in nonvisible locations. An evaluation shall be submitted to NRR for review and approval prior to return to operation.

3. Any cracking identified in the core spray cooling system shall be reported to the Director of the appropriate NRC Regional Office within 24 hours of identification.

4. A written report of the results of the examinations including any corrective measures taken shall be submitted within 30 days of the completion of the examination to the Director of the NRC Regional Office with a copy to the NRC Office of Inspection and Enforcement, Division of Reactor Operations Inspection, Washington, D. C. 20555.

Approved by GAO, B180225 (R0072); clearance expires 7-31-80. Approval was given under a blanket clearance specifically for identified generic problems.

Enclosure

RECENTLY ISSUED
IE BULLETINS

Bulletin No.	Subject	Date Issued	Issued To
80-12	Decay Heat Removal System Operability	5/9/80	Each PWR with an OL
80-11	Masonry Wall Design	5/8/80	All power reactor facilities with an OL, except Trojan
80-10	Contamination of Nonradioactive System and Resulting Potential for Unmonitored, Uncontrolled Release to Environment	5/6/80	All power reactor facilities with an OL or CP
80-09	Hydramotor Actuator Deficiencies	4/17/80	All power reactor operating facilities and holders of power reactor construction permits
80-08	Examination of Containment Liner Penetration Welds	4/7/80	All power reactors with a CP and/or OL no later than April 7, 1980
80-07	BWR Jet Pump Assembly Failure	4/4/80	All GE BWR-3 and BWR-4 facilities with an OL
80-06	Engineered Safety Feature (ESF) Reset Controls	3/13/80	All power reactor facilities with an OL
80-05	Vacuum Condition Resulting In Damage To Chemical Volume Control System (CVCS) Holdup Tanks	3/10/80	All PWR power reactor facilities holding OLs and to those with a CP
79-01B	Environmental Qualification of Class IE Equipment	2/29/80	All power reactor facilities with an OL
80-04	Analysis of a PWR Main Steam Line Break With Continued Feedwater Addition	2/8/80	All PWR reactor facilities holding OLs and to those nearing licensing
80-03	Loss of Charcoal From Standard Type II, 2 Inch, Tray Adsorber Cells	2/6/80	All holders of Power Reactor OLs and CPs