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ComEd

October 3, 1996
JSPLTR #96-0177

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn: Document Control Desk

Subject: Dresden Nuclear Power Station Unit 3
Submittal of Core Spray Inspection Plan for Dresden Unit 3
NRC Docket No. 50-249

References:
(1) E.D. Swartz (ComEd) letter to USNRC, Response to IE Bulletin 80-13 "Cracking in Core Spray Spargers", Dated May 4, 1982

(2) NUREG/CR-4523, Closeout of IE Bulletin 80-13: Cracking In Core Spray Spargers, Dated January, 1988

(3) BWRVIP Document BWRVIP-18, BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines, Dated July, 1996

(4) BWRVIP Document BWRVIP-03, Reactor Vessel and Internals Examination Guidelines, Dated October, 1995

(5) J.H. Riddle (Siemens) letter to R.J. Chin (ComEd), Importance of LPCS Spray Distribution During a LOCA, Dated August 30, 1996

The purpose of this letter is to inform the NRC staff of ComEd's plans to implement the recommendations of the BWRVIP "BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines" [Reference (3)] in the performance of internal core spray examinations and evaluations during the upcoming Dresden Unit 3 D3R14 refuel outage.

IE Bulletin 80-13 required BWRs to perform a visual examination of the core spray spargers and the segment of piping from the RPV to the shroud at the next outage and at each subsequent outage until further notice. The bulletin also provided minimum requirements for the resolution capability of the inspection equipment. The viewing insitu of 0.001 inch diameter fine wires was considered an acceptable means of demonstrating suitable resolution for the examination. In Reference (1) ComEd provided the NRC Staff the results of the initial

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core spray sparger examinations on Unit 3. This letter also stated that inspection of the core spray spargers on both Dresden Units 2 and 3 would continue to be performed during every refuel outage until further notice. NUREG/CR-4523 [Reference (2)] closed out IE Bulletin 80-13 for Dresden Units 2 and 3 based on the conclusion that ComEd would continue to apply the requirements of IE Bulletin 80-13 in the future.

Due to the increased rate of internal core spray piping cracking being experienced in the industry, the BWRVIP recently developed and distributed report BWRVIP-18, "BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines" [Reference (3)], "the guidelines". This document provides specific inspection guidelines for all locations of the core spray internals, taking into consideration the safety significance and expected susceptibility of each location. The guidelines incorporate the knowledge and lessons learned over the past 16 years of core spray examinations, and are designed to ensure the continued integrity of the internal core spray piping. Implementation of an inspection plan based upon these recommendations will satisfy the Reference (2) commitment regarding the performance of core spray sparger examinations at each refuel outage.

The internal core spray piping inspection plan for Dresden Unit 3 was developed in accordance with Section 3 of the guidelines. Section 3 of the guidelines provides specific inspection recommendations for both baseline inspections and reinspections of piping locations, sparger locations, hidden welds, piping and sparger surfaces away from welds, piping and sparger brackets, and repairs. The Dresden Unit 3 inspection plans for each of these items is provided in Attachment 1.

Implementation of the BWRVIP "BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines" during the upcoming D3R14 and subsequent refuel outages, as described in Attachment 1, will provide continued assurance of the integrity of the internal core spray piping at Dresden Unit 3.

If there are any questions concerning this matter, or need for further clarification, please contact this office.

Sincerely,

J. Stephen Perry
Site Vice President
Dresden Station

OFFICIAL SEAL
SHERRY L BUTTERFIELD
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES:05/23/00

Subscribed and Sworn to before me
on this 4 day of
October, 1996.

Sherry L. Butterfield
Notary Public

Attachments: Attachment 1, Dresden Unit 3 Core Spray Inspection Plan for D3R14

J.H. Riddle (Siemens) letter to R.J. Chin (ComEd), Importance of LPCS Spray Distribution During a LOCA, Dated August 30, 1996

JSP/rmt

cc: A. B. Beach, Regional Administrator - RIII
J. F. Stang, Project Manager - NRR
C.L. Vanderniet, Senior Resident Inspector - Dresden
Office of Nuclear Facility Safety - IDNS

Attachment 1
(1 of 2)
Dresden Unit 3 Core Spray Inspection Plan for D3R14

Piping Locations

Per Section 3.2.2 of Reference (3), the scope of the baseline inspection for piping welds depends upon the inspection method to be used (visual or volumetric) and the type of piping material. The core spray piping at Dresden Unit 3 is made from 304 stainless steel. Dresden is currently planning to perform a fully automated ultrasonic examination of all core spray piping welds from the T-box at the RPV nozzle to the connection at the shroud during the D3R14 refuel outage, per the guidelines of Reference (4). Any welds inaccessible for ultrasonic examination will be inspected using the enhanced VT-1 visual inspection method, per the guidelines of Reference (4). The scope and frequency of subsequent piping examinations will be performed per Section 3.3.1 of Reference (3) for the inspection methods utilized.

Sparger Locations

Per Section 3.2.3 of Reference (3), the scope of the baseline inspection for spargers is dependent upon whether a plant is classified as "geometry tolerant" or "geometry critical". A "geometry tolerant" plant is one in which post-LOCA steaming of the water at two-thirds core height is sufficient to meet fuel safety limits, so spray distribution per the design is not essential. For these plants it is only necessary to deliver the core spray water inside the shroud to maintain two-thirds core coverage. As such, a less detailed examination of the sparger is warranted for a geometry tolerant plant. The LOCA analysis for Dresden Unit 3 does not rely upon any assumptions related to the sparger spray distribution [Reference (5), attached]. Consequently, Dresden Unit 3 is considered a geometry tolerant plant and will perform examinations of the core spray sparger per Section 3.2.3.2 of Reference (3). Specifically, Dresden will perform a modified VT-1 (also known as CSVT-1) of the sparger tee box cover plate welds (location S1), sparger to tee box welds (location S2), and sparger end cap welds (location S4) during the D3R14 refuel outage, per the guidelines of Reference (4). Additionally, a VT-3 examination will be performed of the remaining sparger piping and nozzles, per the guidelines of Reference (4). The scope and frequency of subsequent sparger examinations will be performed per Section 3.3.2.2 of Reference (3).

Hidden Welds

The core spray design at Dresden Unit 3 contains one partially obstructed weld and one hidden weld at the RPV nozzle thermal sleeve and tee box areas, and one hidden weld at the downcomer piping connections to the shroud. Per Section 3.2.4 of Reference (3), Dresden will perform a best effort ultrasonic or enhanced visual inspection of the partially obstructed welds during the D3R14 refuel outage, per the guidelines of Reference (4). The scope and frequency of subsequent hidden or partially obstructed weld examinations will be performed per Section 3.3.3 of Reference (3).

Dresden Unit 3 Core Spray Inspection Plan for D3R14

Piping and Sparger Brackets

Per Section 3.2.4 of Reference (3), Dresden will perform a modified VT-1 (also known as CSVT-1) examination of the core spray piping brackets during the D3R14 refuel outage, per the guidelines of Reference (4). Additionally, a VT-3 examination will be performed of the core spray sparger brackets, per the guidelines of Reference (4). The scope and frequency of subsequent piping and sparger bracket examinations will be performed per Section 3.3.3 of Reference (3).

Repairs

The existing lower downcomer elbow repairs on Dresden Unit 3 will be removed to allow for inspection of the piping welds currently obstructed by the repair. Should installation of a new repair be required, the repair will be baseline examined per Section 3.2.4 of Reference (3). The scope and frequency of any subsequent repair examinations will be performed per Section 3.3.3 of Reference (3).

Piping and Sparger Surfaces away from Welds

Per Section 3.2.4 of Reference (3), arc strikes, draw beads, cold work, etc., could have the potential to initiate cracking in surfaces of the core spray piping and spargers away from the welds. However, these potential sources of crack initiation would not tend to sustain cracking through wall unless a sensitized assembly weld was nearby. Consequently, no detailed future inspections of piping and sparger surfaces away from welds are planned for Dresden Unit 3.

SIEMENS

August 30, 1996
JHR:96:341

Dr. Ronald J. Chin
Nuclear Fuel Services (Suite 400)
Commonwealth Edison Company
1400 Opus Place
Downers Grove, IL 60515-5701

Dear Dr. Chin:

Importance of LPCS Spray Distribution During a LOCA

Ref: 1. Compendium of ECCS Research for Realistic LOCA Analysis, NUREG-1230 R4, December 1988.

2. Contract between Commonwealth Edison Company and Siemens Power Corporation for the Supply of Nuclear Fuel and Related Materials and Services for the Dresden, Quad Cities, and LaSalle Nuclear Power Stations, October 1, 1993, as amended.

John Freeman of ComEd requested SPC to identify any assumptions in the SPC loss of coolant accident analysis (LOCA) methodology related to the effectiveness of the low pressure core spray (LPCS). This information is being requested by ComEd to determine if any plant testing is required to confirm LPCS flow distribution assumptions used in SPC LOCA analyses for Dresden, LaSalle, or Quad Cities. Please provide the following response to ComEd.

During a LOCA, the LPCS system injects coolant into the upper plenum region above the core. The coolant is sprayed into the upper plenum by a large number of nozzles located on a circular header above the core. The nozzles are designed to distribute the ECCS flow across the top of the core. In the 1970s, GE tested the LPCS sparger and nozzle design to determine the minimum flow that would reach each bundle in the core at rated LPCS flow conditions. The SPC LOCA methodology has a spray cooling period which uses Appendix K spray cooling coefficients. The Appendix K coefficients were supported based on BWR-FLECHT and SPC spray cooling tests. The tests were performed with a minimum spray flow rate supplied to the test assembly.

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Subsequent to the GE spray distribution tests discussed above, a number of large-scale BWR tests were performed (Reference 1) which demonstrate that the ability of the core spray to provide cooling is not strongly dependent on the spray distribution. During a LOCA, countercurrent flow conditions exist at the top of the fuel assemblies resulting in an accumulation of ECCS liquid above the top of the core. Because the core is covered by a layer of liquid, the core spray pattern has essentially no effect on how much water enters the active fuel region. Some of the liquid above the core flows into the fuel assemblies as allowed by countercurrent flow conditions. Much larger amounts of the liquid flow into the bypass region and subsequently into the lower plenum. The flow to the lower plenum assists the low pressure coolant injection (LPCI) system in refilling the lower plenum and results in an earlier core reflood.

The amount of cooling provided by LPCS prior to core reflood is limited by countercurrent flow conditions and not by the core spray distribution. The SPC LOCA analysis methodology does not rely on any assumptions related to the LPCS flow distribution; the spray heat transfer coefficients used by SPC are supported by tests with countercurrent flow conditions at the upper tie plate.

Very truly yours,

J H Riddle

J. H. Riddle
Project Manager

ecm

cc: Max L. Hymas (SPC)
James E. Nevling (ComEd)