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ADJUDICATIONS STAFF

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos:	50-454; 50-455
License Nos:	NPF-37; NPF-66
Report No:	05000454/2007009 and 05000455/2007009
Licensee:	Exelon Generation Company, LLC
Facility:	Byron Station, Units 1 and 2
Location:	Byron, IL 61010
Dates:	October 23, 2007 through February 14, 2008
Inspectors:	M. Holmberg, Team Lead T. Bilik, Reactor Inspector V. Meghani, Reactor Inspector C. Moore, Operator Licensing Examiner J. McGhee, Reactor Engineer L. Kozak, Senior Reactor Analyst
Approved by:	D. Hills, Chief Engineering Branch 1 Division of Reactor Safety

U.S. NUCLEAR REGULATORY COMMISSION
In the Matter of Entergy (Pilgrim Nuclear Power Station)
Docket No. 50-293-LR Official Exhibit No. 606
OFFERED by: Applicant/Licensee Intervenor
NRC Staff Other NRC Staff Exh. 28
IDENTIFIED on 4-10-08 Witness/Panel
Action Taken: ADMITTED REJECTED WITHDRAWN
Reporter/Clerk Thibault

Temp = SECY-027

D503

REPORT DETAILS

Background and Overview

The essential service water (SX) system rejects heat to the SX cooling tower, both on a normal and on an emergency basis. The tower and SX basin constitute the ultimate heat sink (UHS) for the SX system and consist of a common eight cell mechanical draft cooling tower with safety-related make up. There is an "A" train side of the tower and a "B" train side of the tower, and each side has one common return from the associated train from each Unit. The discharges from each SX loop in each Unit are separate but merge into two separate and redundant return lines for SX system return to the cooling tower basin. Near the tower, the buried 48 inch diameter common return line splits into four buried 24 inch diameter lines which return water to individual cells within the cooling tower. The buried portions of this 24 inch diameter SX pipe reach the above-ground elevations within an enclosed chamber (referred hereinafter as a vault). These vaults are constructed of concrete and removable steel plates which serve to protect SX piping components from tornado generated missiles. Within each of the eight vaults, the portion of 24 inch diameter SX riser pipe runs vertically up through the concrete floor and terminates at a flange which supports a discharge isolation valve. Although, the SX riser vaults are enclosed, rainwater can enter through the roof/door interface and wind driven spray from the SX cooling tower outfall can enter through sheet metal panels forming the backwalls of the riser vaults. The floor of each riser vault is sloped to allow water to flow into drain holes (typically two) at the corner of the vault floor. Water intrusion into these vaults has contacted the uncoated carbon steel riser pipe providing a semi-continuous wetted environment, which caused significant external corrosion and wastage around the pipe perimeter just above the concrete floor elevation (Attachment 3, Pictures No. 1 through No. 5). The corroded portion of each riser pipe extended vertically four to six inches in height between the concrete floor and the support flange for its associated motor operated discharge isolation valve. The nominal pipe wall was originally 0.375 inch thick for these eight degraded pipes which are described as 0A through 0H SX riser pipes within this report.

The circumstances surrounding the essential service water riser pipe degradation was evaluated against the criteria in Management Directive 8.3, "NRC Incident Investigation Program," and Inspection Manual Chapter 0309 "Reactive Inspection Decision Basis for Reactors." Deterministic Criteria g and h of Management Directive 8.3 were met for this event. A conditional core damage probability (CCDP) estimate for a reactor transient was performed to represent the dual Unit plant shutdown. The essential service water system was determined to be available because the leak on the 0C SX riser was well within the capacity of the essential service water makeup system and as a result there was no actual loss of essential service water function. The CCDP estimate using the NRC's Simplified Plant Analysis Risk model, Revision 3.31, was 2.6E-6. This estimate is within the range of a special inspection. This risk calculation did not consider the potential impact of the degradation of the essential service water system due to corrosion and pipe wall thinning. A quantitative risk estimate could not be estimated for this condition, but the excessive pipe wall thinning could contribute to an increase in the loss of SX initiating event frequency. Because the loss of SX event is generally a high consequence event and the pipe degradation was common across all SX risers, the qualitative risk insights also supported a special inspection. Therefore, based on the probabilistic risk and deterministic criteria specified in Management Directive 8.3 and Inspection Procedure 71153, "Event Followup," a Special Inspection was initiated in accordance with Inspection Procedure 93812, "Special Inspection." The special inspection focus areas included the nine charter items related to the degraded SX riser piping (Attachment 4 – Special Inspection Team Charter).