Entergy

Entergy Nuclear Operations, Inc.
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043
269.764.2000

Anthony J. Vitale
Site Vice President

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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Subject: Safety Injection Refueling Water Tank Leakage and Corrective Actions

Palisades Nuclear Plant
Docket 50-255
License No. DPR-20

Dear Sir or Madam:

Entergy Nuclear Operations, Inc (ENO) identified potential leakage from the safety injection refueling water (SIRW) tank at the Palisades Nuclear Plant (PNP) in May 2011. Attachment 1 provides a summary of the leakage issues, as well as a discussion of corrective actions taken.

Commitments are listed in Attachment 2.

Sincerely,

AS AUTHORIZED BY A. VITALE, SITE VICE PRESIDENT, PALISADES ON JULY 12, 2012

AJV/bed

Attachment 1: Safety Injection Refueling Water Tank Leakage and Corrective Actions
Attachment 2: List of Commitments

CC Administrator, Region III, USNRC
Project Manager, Palisades, USNRC
Resident Inspector, Palisades, USNRC

Attachment 1

Safety Injection Refueling Water Tank Leakage and Corrective Actions

History

In May 2011, Entergy Nuclear Operations, Inc (ENO) personnel observed droplets of water on a small carpeted area of a corner in the control room at the Palisades Nuclear Plant (PNP). Initial investigation could not determine whether the droplets were a result of leakage from the Safety Injection Refueling Water (SIRW) tank or rain water from the roof.

The SIRW tank sits on a sand bed above a concrete support structure. The control room and adjacent areas are located beneath the concrete support structure. During a subsequent investigation, a leak within the concrete support structure area under the SIRW tank was identified. Although it was suspected during this investigation that there was a leak in the SIRW tank, a leak could not be traced back to a specific defect in the SIRW tank because the bottom of the tank was inaccessible. In addition, roofing material was identified as degraded around a roof penetration, which allowed rain water to work its way through an existing crack and into the control room. The degraded roofing material was patched and Technical Specification (TS) tracer gas testing was performed to determine control room envelope operability based on the amount of unfiltered air in-leakage. The tracer gas testing results were compared to the previous tracer gas testing results, which showed no decline in the ability of the ventilation system to maintain pressure within TS limits with respect to areas adjacent to the control room envelope. The control room envelope remained operable and monitoring of the leakage continued. Analysis of the leakage collected over several months revealed the most likely source to be the SIRW tank. The SIRW tank repair was added to the scope of the April 2012, refueling outage.

Refueling Outage 1R22 SIRW Tank Inspections and Work Performed

The SIRW tank was removed from service in April 2012, at the beginning of the 1R22 refueling outage. The tank was completely drained for non-destructive examinations (NDE). Floor plate welds were vacuum box tested, plate to nozzle welds were dye penetrant tested, and an enhanced visual inspection was performed on the floor to shell welds. These examinations did not reveal any flaws in the tank. However, internal inspection of the "N" nozzle, that had been retired-in-place, revealed some deformation of the nozzle internals. The "N" nozzle was preemptively removed from service by installing a patch plate over the nozzle.

During the post-maintenance testing refill of the tank on April 29, 2012, leakage was identified in the concrete support structure under the SIRW tank. In order to apply the provision of the ASME Code Case N-705 for a tank leak from a hidden flaw and allow plant start-up with the leak, conservative assumptions regarding flaw characteristics and locations were made. Engineering calculation documents a critical flaw size of 1.2 inches and an allowable flaw size of 0.33 inches. A measured leak rate acceptance criteria was used to geometrically limit the most limiting flaw size to acceptable levels.

An operational decision making issue (ODMI) was initiated to provide trigger points for action in case leakage increased, and the tank was declared operable with compensatory measures.

June 2012 Tank Inspections and Work Performed

On June 12, 2012, the ODMI shutdown trigger point of >31 gallons per day was reached. As a result, the SIRW tank was declared inoperable and the plant was shut down to Mode 5.

An inspection plan was developed to determine the source of the leakage. The entire tank below the circumferential welds between the floor and the tank sides was included in the inspection plan, as well as the circumferential welds themselves. Several inspection techniques were used, depending on what area of the tank was being examined.

On June 13th, prior to tank drain, attempts were also made to determine the source of the leak using acoustic emission location technology. These attempts were limited in success due to the levels of background noise when the test was performed. The technique did note probable leakage in the quadrant of the tank that contains the "L" Nozzle.

Repairs were completed and on June 27, 2012, during the post-maintenance testing refill, leakage was observed in the concrete support structure under the tank. A sample of the leakage was taken from each side of the concrete support structure area, and the leakage was confirmed to be originating from the SIRW tank. The SIRW tank was subsequently re-drained to perform further tank inspections.

As a result of exhaustive inspection methods, repairs were made to the tank and enhancements implemented to improve the tank's structural design features.

During these additional repair activities, water used for maintenance was identified by control room staff to be dripping into the control room. This was determined to be the result of the removal of the catch containers from the concrete support structure while the additional repair work was being performed.

Overall, the following repairs and modifications were completed:

Discovery	Discovery Location	Repair Method
Weld Subsurface Flaw	"E" Nozzle Weld	Nozzle weld was replaced. Nozzle was not replaced.
Deformation of Piping	"E" Nozzle	Reinforced with Plate at Nozzle Weld.

Surface Cracking (Multiple Linear Indications)	"J" Nozzle Piping	"J" Nozzle Separated from Floor Plates and Capped.
Internal Surface Multiple Linear Indications	"K" Nozzle Piping "M" Nozzle Piping	Both Nozzles were Replaced and Reinforced with Plate.
Cracked Weld (Through-Weld)	"L" Nozzle Weld	"L" Nozzle was Replaced and Reinforced with Plate.
Indication in Floor Plate Weld	~3" from Central Vertical Support	Ground out Indication and Re-welded. Not Through Wall.
Indication at Weld Under Roof Support Plate	Underneath the Central Vertical Support	Ground out Indication and Re-welded. Through wall crack.
Cracked Concrete	Vicinity of "L" Nozzle	Evaluated as Being Structurally Insignificant
Sand Voids	Various Areas of the Tank Floor	Holes Drilled in SIRW tank at Multiple Locations for Addition of Sand. Cover Plates were Welded Over Holes.
Deformation of Piping	"F" Nozzle (West)	Per Engineering Evaluation, no Repairs Performed.
90+ Indications in the Floor Plate to Shell Welds and Floor Plate to Floor Plate Welds	Various Areas of the Tank	Ground Out Indications and Re-welded the Indications that were Through Wall.

On July 6, 2012, refill of the tank commenced, and a small amount of drainage was noted in the concrete support structure area. It has yet to be determined whether this drainage is from the tank or from accumulated moisture being compressed from the sand bed beneath the tank.

The SIRW tank continues to satisfy its safety function. Leakage from the tank is acceptable, per American Society of Mechanical Engineers (ASME) Code Case N-705, as the structural condition of the tank has been evaluated as satisfactory based on a calculated maximum allowable flaw size. Any leakage from the tank will continue to be monitored under the approved ODMI developed to ensure the leakage allowed by the maximum flaw size is not exceeded. This calculated limit is currently 38 gallons per day. The currently approved ODMI directs a plant shut down when leakage exceeds 34 gallons per day.

A temporary modification was installed to preclude any SIRW tank leakage into the control room, as described in Completed Actions.

Completed Actions

1. Drip pans and robust catch basins/berms were installed at the east and west areas below the SIRW tank.

2. An inspection was performed of the installed catch basin and drip trays to verify proper placement of the temporary modification. The catch basin was attached to the walls. The catch basin precludes water that might overflow out of the drip trays from seeping into the control room envelope.

ENO is implementing the following actions to ensure SIRW tank compliance with Code Case N-705, and to ensure concrete support structure conformance with the PNP Final Safety Analysis Report.

Corrective Actions

1. ENO will measure and trend leakage daily from the SIRW tank in accordance with the approved ODMI until such time as the SIRW tank is declared fully operable. The degradation growth rate will be calculated to determine the need for future SIRW tank internal inspections. ENO will re-perform the growth rate calculation periodically, depending on changes in the observed leakage rate.

2. ENO will declare the SIRW tank inoperable and shut down the plant, as required by Technical Specifications, if leakage reaches the calculated limit, in accordance with the approved ODMI. If the value of the calculated limit changes, ENO will notify the NRC.

3. If monitoring determines that the SIRW tank is actively leaking, then ENO will take appropriate actions to repair the SIRW tank within the time frame required by ASME Code Case N-705.

4. ENO will continue inspections of the concrete support structure above the control room, control room hallway, and the concrete support structure ceiling, as prescribed in the approved ODMI.

5. ENO will correct the condition related to water seepage through the concrete support structure into the control room prior to restart from the 2013 refueling outage.

Conclusion

In accordance with ENO procedures and processes which meet regulatory requirements, continued plant operation with the above actions in place is acceptable. Based on surveillance testing, the control room envelope remains operable with a nonconformance with respect to the Final Safety Analysis Report. The leakage observed from the SIRW tank is insignificant when compared to the total tank volume, and if a flaw exists, it is expected to be much smaller than that bounded by the evaluation.

Attachment 2

List of Commitments

This table identifies actions discussed in this letter for which Entergy commits to perform. Any other actions discussed in this submittal are described for the NRC's information and are not commitments.

COMMITMENT	TYPE (Check one)		SCHEDULED COMPLETION DATE (If Required)
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
ENO will measure and trend leakage daily from the SIRW tank in accordance with the approved ODMI until such time as the SIRW tank is declared fully operable. The degradation growth rate will be calculated to determine the need for future SIRW tank internal inspections. ENO will re-perform the growth rate calculation periodically, depending on changes in observed leakage rate.		**X (Engineering)**	
ENO will declare the SIRW tank inoperable and shut down the plant, as required by Technical Specifications, if leakage reaches the calculated limit, in accordance with the approved ODMI. If the value of the calculated limit changes, ENO will notify the NRC.		**X (Operations)**	
If monitoring determines that the SIRW tank is actively leaking, then ENO will take appropriate actions to repair the SIRW tank within the time frame required by ASME Code Case N-705.	**X (Projects)**		
ENO will continue inspections of the concrete support structure above the control room, control room hallway, and the concrete support structure ceiling, as prescribed in the approved ODMI.		**X (Operations)**	
ENO will correct the condition related to water seepage through the concrete support structure into the control room prior to restart from the 2013 refueling outage.	**X (Engineering)**		**Prior to restart from the 2013 refueling outage.**