



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 5, 2015

LICENSEE: Arizona Public Service Company

FACILITY: Palo Verde Nuclear Generating Station, Units 1, 2, and 3

SUBJECT: SUMMARY OF AUGUST 26, 2015, MEETING WITH ARIZONA PUBLIC SERVICE COMPANY REGARDING THE ONGOING RESOLUTION OF GENERIC LETTER 2004-02 FOR PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3 (TAC NOS. MC4702, MC4703, AND MC4704)

On August 26, 2015, the U.S. Nuclear Regulatory Commission (NRC) staff hosted a Category 1 public meeting conference call with staff from Arizona Public Service Company (APS, the licensee) at NRC Headquarters, One White Flint North, 11555 Rockville Pike, Rockville, Maryland. The purpose of this meeting was to discuss the recent insulation discovery and resolution options relating to Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors," for Palo Verde Nuclear Generating Station (PVNGS), Units 1, 2, and 3. The meeting notice and agenda, dated July 30, 2015, are available in the Agencywide Documents Access and Management System (ADAMS) at Accession No. ML15211A013. The licensee provided presentation slides, which are available at ADAMS Accession No. ML15236A134. The Enclosure contains the meeting attendance list.

The licensee presented an overview of the recent insulation discovery and provided information regarding resolution of GL 2004-02 for PVNGS. On December 18, 2013, APS submitted Revision 2 to the supplemental response to GL 2004-02 (ADAMS Accession No. ML13357A218). On April 15, 2015, APS documented its failure to identify and evaluate microtherm on the reactor vessel by entering it into the corrective action program. The microtherm was discovered in several locations on the reactor vessel, including an approximately 10-foot band encompassing the hot- and cold-leg elevation, during an unrelated review of plant drawings. On June 10, 2015, the NRC staff hosted a public teleconference with APS to discuss the recently discovered microtherm. The meeting summary and the licensee's presentation slides are available at ADAMS Accession No. ML15239B322 and ML15156B352, respectively. In the June 10th meeting, the licensee presented three potential outcomes for a path forward to resolve GL 2004-02. The first outcome is to demonstrate the reactor vessel break is not limiting with respect to emergency core cooling system (ECCS) strainer performance in order to determine if the current submittal is still bounding. The second outcome is to remove the microtherm insulation. The third outcome is to justify the current configuration with the microtherm using a risk-informed approach or further evaluation and testing. At the August 26th meeting, the licensee stated its plan to pursue Option 3 (justify current configuration with microtherm). NRC staff questioned if APS has communicated with the industry on the discovered microtherm so that other licensees could ensure that similar issues had not occurred at their facilities. The licensee stated its plan to send a report to the Institute of Nuclear Power Operations.

The licensee discussed the possible reactor vessel microtherm break locations and identified the steam generator (SG) hot-leg nozzle as the most limiting break location. The licensee stated that another type of fiber-based insulation was recently found on the reactor pressure vessel (RPV) and reactor coolant system piping in isolated locations, called Temp-Mat. This is in addition to the fiber-based insulation, Microtherm, found in April 2015. The licensee stated its plan to keep the current configuration of the microtherm (Option 3) and to also remove parts of the Temp-Mat. Removal of the Temp-Mat in Units 1, 2, and 3 will maintain a low-fiber amount. The licensee noted that a greater amount of Temp-Mat was discovered in Unit 3 and, therefore, more will be removed from Unit 3. The newly discovered Temp-Mat affects the existing limiting break location (SG hot-leg nozzle) and impacts the new RPV break location. More information on the location of the recently discovered Temp-Mat can be found on Slide 6 of the licensee's presentation slides. NRC staff questioned if all of the fibrous insulation had now been identified and who performed the initial plant evaluations. The licensee stated that it had confidence all the fibrous insulation has been identified and that a complete drawing review has been completed by its contractor, Alion Science & Technology (Alion). The licensee stated it will perform a final walkdown of containment with Alion to verify all the insulation has been identified. The licensee stated that a particular APS contractor had done the prior work, including the plant evaluations, but noted it remains the licensee's responsibility.

The licensee then discussed the analysis to date, including debris generation, debris transport, industry testing, and net positive suction head (NPSH). To minimize the debris generation, the licensee discussed its primary success path is to remove the Temp-Mat for the current limiting break. The licensee noted that the encapsulated microtherm zone of influence and the restrained separation of the pipe at the RPV nozzle break limits the microtherm quantity to the local region of the break location. If there is a reactor nozzle break, the radial pipe separation is limited because of the concrete, and the axial pipe separation is limited because of SG supports and the reactor coolant pump. The licensee then discussed debris transport, specifically, if there was a RPV nozzle break. The licensee stated the Temp-Mat generated within the reactor compartment will transport to the reactor cavity (underneath the RPV), but will not transport to strainers based on very low-flow velocity and a large upward vertical flow path in the cavity. NRC staff questioned whether the fines generated by the break would transport since approved guidance is that fines are easily suspendable and transport with the fluid. The licensee noted that all generated microtherm is assumed to transport to the strainers. APS discussed testing for Salem Nuclear Power Plant, Unit 2 (Salem 2) to analyze head loss conditions for post loss-of-coolant accident scenarios with Min-K insulation which is very similar to microtherm. The licensee stated that the Salem 2 test bounds PVNGS and the analysis indicates that the PVNGS NPSH and structural limits should be bounded by the existing SG hot-leg break location.

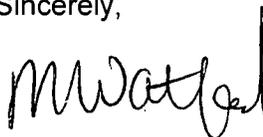
APS then discussed its future actions, including removal of Temp-Mat and analysis of impact of identified Temp-Mat and microtherm on the RPV for chemical effects and strainer head loss. APS also discussed finalizing the analysis of the potential scenario failure of the low-pressure safety injection (LPSI) pump to trip after receipt of the recirculation actuation signal. This is a specific concern for PVNGS and a few other plants because their LPSI pumps have a much higher flow than their high-pressure safety injection (HPSI) pumps. The strainer designs were based off the HPSI pump flow and, therefore, a lower pump flow. Lastly, the licensee plans to complete the final review of the assessment report and submit an addendum to the GL 2004-02 supplement dated December 18, 2013 (ADAMS Accession No. ML13357A218).

During the question and answer portion of the meeting, the NRC staff asked several questions. NRC staff asked about the schedule for removal of Temp-Mat and the licensee stated its plan to replace the insulation with new material in each unit's outage, starting with Unit 2 this fall, Unit 1 next spring, and Unit 3 next fall. NRC staff asked about the licensee implementing a risk-informed approach and the licensee stated that a risk-informed approach is not necessary and has no current plans to use that approach. NRC staff asked if the licensee performed an analysis on smaller hot-leg pipe breaks. The licensee stated that based on the analysis, smaller piping would not create as much debris as the limiting hot-leg break; therefore, APS analyzed the most limiting break (SG hot-leg nozzle). NRC staff expressed interest in learning more about the Salem 2 tests and how it bounds PVNGS. APS stated it is finishing the evaluation and plans to include the analysis in the addendum. After further analysis, APS would like to schedule another public meeting to discuss the resolution of GL 2004-02.

The NRC did not receive any public meeting feedback forms. A member of the public, Mr. Ace Hoffman, questioned why the NRC did not consider the fibrous material to be a bigger problem because it was only recently discovered and the licensee is not planning to analyze small breaks. Also, other plants with the same contractor could have had a similar issue at their facilities. The NRC staff appreciated the comment and plans to perform a more in-depth review once the licensee submits its addendum to the GL 2004-2 supplement dated December 18, 2013.

If you have any questions, please contact me at (301) 415-1233 or via e-mail at Margaret.Watford@nrc.gov.

Sincerely,



Margaret M. Watford, Project Manager
Plant Licensing Branch IV-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-528, STN 50-529,
and STN 50-530

Enclosure:
As stated

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LIST OF ATTENDEES

AUGUST 26, 2015, PUBLIC MEETING WITH ARIZONA PUBLIC SERVICE COMPANY

REGARDING ONGOING RESOLUTION OF GENERIC LETTER 2004-02

ARIZONA PUBLIC SERVICE COMPANY

PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3

DOCKET NOS. STN 50-528, STN 50-529, AND STN 50-530

| Name | Affiliation |
|-------------------|--------------------|
| Margaret Watford | NRC |
| Michael Markley | NRC |
| Lisa Regner | NRC |
| Victor Cusumano | NRC |
| C.J. Fong | NRC |
| Matthew Yoder | NRC |
| Ashley Smith | NRC |
| Stephen Smith | NRC |
| John Stang | NRC |
| Paul Klein | NRC |
| Marioly Diaz | NRC |
| Lindsay Robinson | NRC |
| Andrea Russell | NRC |
| Maria Lacal | APS |
| Thomas Weber | APS |
| Michael Dilorenzo | APS |
| Carl Stephenson | APS |
| Mathew Cox | APS |
| Kenneth House | APS |
| Alfred Meeden | APS |
| Dominic Macedonia | APS |
| Carl Stafford | APS |
| Martin Rozboril | Alion |
| Megan Stachowiak | Alion |
| Andrew Roudenko | Alion |
| Bruce Letelliar | Alion |
| Ace Hoffman | Public |

Enclosure

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/RA/

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ADAMS Accession Nos. ML15268A131 (Mtg Summary); ML15211A013 (Mtg Notice); ML15236A134 (licensee slides)

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|--------|--------------------|----------------------|--------------------|
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| NAME | MWatford | JBurkhardt | GKulesa |
| DATE | 9/28/15 | 9/25/15 | 10/2/15 |
| OFFICE | NRR/DSS/SSIB/BC | NRR/DORL/LPL4-1/BC | NRR/DORL/LPL4-1/PM |
| NAME | VCusumano | MMarkley LRegner for | MWatford |
| DATE | 10/2/15 | 10/2/15 | 10/5/15 |

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