



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

May 1, 2017

Mr. Robert S. Bement
Executive Vice President Nuclear/
Chief Nuclear Officer
Mail Station 7602
Arizona Public Service Company
P.O. Box 52034
Phoenix, AZ 85072-2034

SUBJECT: PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3 -
REGULATORY AUDIT REPORT FOR THE MARCH 8, 2017, AUDIT AT THE
EXCEL FACILITY IN ROCKVILLE, MARYLAND, FOR THE LICENSE
AMENDMENT AND EXEMPTION REQUESTS ASSOCIATED WITH NEXT
GENERATION FUEL (CAC NOS. MF8076 TO MF8081)

Dear Mr. Bement:

By letter dated July 1, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16188A336), Arizona Public Service Company (APS, the licensee) submitted a license amendment request (LAR) for Palo Verde Nuclear Generating Station (PVNGS), Units 1, 2, and 3, requesting an approval to revise the Technical Specifications to support the implementation of next generation fuel (NGF). In addition to the LAR and in accordance with the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.12, the licensee is requesting an exemption from certain requirements of 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems [ECCS] for light-water nuclear power reactors," and 10 CFR Part 50, Appendix K, "ECCS Evaluation Models," to allow the use of Optimized ZIRLO™ as a fuel rod cladding material. In summary, the proposed change will allow for the implementation of NGF including the use of Optimized ZIRLO™ fuel rod cladding material. The NGF assemblies contain advanced features to enhance fuel reliability, thermal performance, and fuel cycle economics.

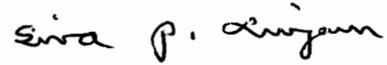
The U.S. Nuclear Regulatory Commission (NRC) staff conducted a regulatory audit at the EXCEL facility in Rockville, Maryland, on March 8, 2017, in order to gain a better understanding of the licensee's LAR and Exemption for PVNGS, Units 1, 2, and 3. The Enclosure to this letter describes the results of the NRC staff's audit. At the beginning of the audit, the licensee presented the slides that contained proprietary information (ADAMS Accession No. ML17079A446).

R. Bement

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If you have any questions, please contact me at 301-415-1564 or via e-mail at Siva.Lingam@nrc.gov.

Sincerely,

Handwritten signature of Siva P. Lingam in black ink.

Siva P. Lingam, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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

Enclosure:
Audit Report

cc w/encl: Distribution via Listserv



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NUCLEAR REGULATORY COMMISSION
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REGULATORY AUDIT REPORT PERFORMED AT

EXCEL FACILITY ON MARCH 8, 2017

IN SUPPORT OF THE NEXT GENERATION FUEL

LICENSE AMENDMENT AND EXEMPTION

ARIZONA PUBLIC SERVICE COMPANY

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

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

1.0 BACKGROUND

By letter dated July 1, 2016 (Agencywide Documents Access and Management System Accession No. ML16188A336), Arizona Public Service Company (APS, the licensee) submitted a license amendment request (LAR) for Palo Verde Nuclear Generating Station (PVNGS), Units 1, 2, and 3, requesting an approval to revise the Technical Specifications to support the implementation of next generation fuel (NGF). In addition to the LAR and in accordance with the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.12, the licensee is requesting an exemption from certain requirements of 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems [ECCS] for light-water nuclear power reactors," and 10 CFR Part 50, Appendix K, "ECCS Evaluation Models," to allow the use of Optimized ZIRLO™ as a fuel rod cladding material. In summary, the proposed change will allow for the implementation of NGF including the use of Optimized ZIRLO™ fuel rod cladding material. The NGF assemblies contain advanced features to enhance fuel reliability, thermal performance, and fuel cycle economics.

The U.S. Nuclear Regulatory Commission (NRC) staff previously conducted a regulatory audit at the Westinghouse Electric Company's (WEC's) facility in Rockville, Maryland, on November 2-3, 2016, to focus the staff's requests for additional information (RAIs) and enhance technical understanding of the submitted documentation associated with the licensee's NGF LAR and Exemption for PVNGS, Units 1, 2, and 3. During this audit, it was determined that further time would be needed to examine materials related to the statistical methodology proposed for analyzing the fuel assembly misload event and the use of the SKBOR code in the boric acid precipitation analysis that were provided during the audit, but not originally available as part of the submittal. Additionally, the NRC staff requested justification for the proposed penalty to address the lack of treatment of thermal conductivity degradation (TCD) in the FATES3B code.

Therefore, a second regulatory audit was conducted on March 8, 2017 (Audit Plan, ADAMS Accession No. ML17054C464), and is summarized in this audit report.

Enclosure

2.0 SCOPE AND PURPOSE

The audit was held on March 8, 2017, at EXCEL Services office in Rockville, Maryland, and was conducted in accordance with the audit plan provided to the licensee. The purpose of the audit was to help the NRC staff better understand the documentation and analysis results through interaction with APS's technical experts and to help focus the staff's RAIs on those questions where docketed information is needed to complete the review. Specifically, the NRC staff discussed the following topics with APS and WEC staff:

- Justification for the proposed penalty to plant operating limits to account for the lack of TCD treatment in FATES3B,
- Statistical treatment of the inadvertent fuel assembly misload event, and
- Boric acid precipitation analysis methodology (SKBOR).

3.0 AUDIT TEAM

The following NRC staff members participated in the audit:

- Shana Helton – Deputy Director
- Robert Lukes – Branch Chief
- Siva P. Lingam – Project Manager
- Daniel Beacon – Lead technical reviewer
- John Lehning – Technical reviewer

The following APS personnel supported the audit:

- Brian Blackmore
- Matthew Cox
- Michael Dilorenzo
- Robert Hicks
- Phillip Hoffspiegel (by phone)
- Charles Karlson (by phone)
- William McDonald
- David Medek (by phone)
- Thomas Remick
- Thomas Weber (by phone)
- Richard Wenzel (by phone)

The following APS consultants also supported the audit:

- Douglas Atkins (WEC)
- Jeffrey Brown (WEC)
- Robert Harris (WEC) (by phone)
- Brett Kellerman (WEC) (by phone)
- Michael Krammen (WEC)
- Edmond Mercier (WEC)
- Amy Miller (WEC) (by phone)
- Max O'Cain (WEC)
- David Rumschlag (WEC)
- Elena Del Sesto (WEC)
- Hans Van de Berg (WEC)
- Michael Volodzko (WEC)

4.0 AUDIT REPORT

At the beginning of the audit, APS provided a presentation highlighting logistics for the fuel transition and the proposed agenda for the day's discussion. WEC staff then proceeded to present an overview of the conclusion drawn from the TCD-related benchmark comparison. Following the overview, the NRC staff and the licensee and vendor staff examined the details of the benchmark study in a breakout session. The NRC staff asked a number of questions and APS and WEC staff provided responses and discussion. WEC and APS staff took away the action to make the details of the benchmark available electronically to the NRC staff for further examination. Additionally, the NRC staff requested that WEC/APS include some additional detail in certain areas of the documentation.

Subsequent discussion of the topic regarded the way in which the appropriate radial fall-off temperature penalty would be included in the license amendment safety evaluation (i.e., license condition or regulatory commitment). The NRC and APS staff discussed the issue and the NRC staff took away the action to continue the discussion internally.

Next, the statistical treatment of the inadvertent fuel misload event analysis was discussed. WEC and APS staff indicated that there have been other similar methods used in the past. The NRC staff acknowledged the point, but questioned the specifics of the method. Ultimately, two potential paths forward on the issue were identified. The first would be to continue to pursue the new method, which may present further technical concerns. The second would be to revert to the currently licensed method, which is more conservative. This would likely predict the occurrence of fuel failures for the event, but within the allowable fuel failure criteria. APS staff took away the action to discuss and decide on the appropriate path to take, which is to be reflected in the related RAI's response.

Finally, details of the boric acid precipitation methodology that was proposed for use in the license amendment request were discussed. During the discussion, the NRC staff asked for results from the SKBOR code that the NRC staff could use to inform an independent confirmatory analysis. The licensee and vendor staff acknowledged the request and took away the action to provide the NRC staff with the information electronically.

5.0 CONCLUSION

Through the audit, the NRC staff obtained an enhanced understanding of the licensee's submittal and the details of the included safety analyses and their results. There was open communication throughout the audit, and this helped the NRC staff to communicate concerns about the submittal and have them answered by APS and WEC. The NRC staff has developed RAIs for the review. Because of the discussions at the two audits that were conducted, the number of potential RAIs has been significantly reduced and the scope of the remaining questions has been focused directly on the topic of concern.

Principal Contributors: D. Beacon, NRR/SNPB
J. Lehning, NRR/SNPB

Date: May 1, 2017

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DWoodyatt, NRR	MPanicker, NRR

ADAMS Accession No.: ML17103A400

*Audit Summary by e-mail

OFFICE	NRR/DORL/LPL4/PM	NRR/DORL/LPL4/LA	NRR/DSS/SNPB/BC*
NAME	SLingam	PBlechman	RLukes
DATE	4/26/2017	4/26/2017	4/11/17
OFFICE	NRR/DORL/LPL4/BC	NRR/DORL/LPL4/PM	
NAME	RPascarelli	SLingam	
DATE	4/28/2017	5/1/2017	

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