10 CFR 50.55a

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102-07589-MLL/MDD
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U. S. Nuclear Regulatory Commission
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References:
1. Arizona Public Service Company (APS) letter number 102-07436, *Fourth 10-Year Interval Pump and Valve Inservice Testing Program Relief Requests GRR-01, GRR-02, PRR-01, PRR-02, PRR-03, PRR-04, PRR-05, and PRR-06,* dated February 23, 2017, [Agencywide Documents Access and Management System (ADAMS) Accession Number ML17054D687]

2. APS letter number 102-07459, *Supplement Regarding Fourth 10-Year Interval Pump and Valve Inservice Testing Program Relief Requests PRR-01, PRR-02, PRR-03, PRR-04, PRR-05, and PRR-06,* dated March 10, 2017, (ADAMS Accession Number ML17069A319)

3. APS letter number 102-07563, *Fourth 10-Year Interval Pump and Valve Inservice Testing Program Relief Requests PRR-01, PRR-02, PRR-03, PRR-04, PRR-05, and PRR-06,* Adoption of 2012 Edition of the American Society of Mechanical Engineers Operation and Maintenance Code dated August 16, 2017, (ADAMS Accession Number ML17228A795)

Dear Sirs:

Subject: **Palo Verde Nuclear Generating Station**
Units 1, 2, and 3
Docket Nos. STN 50-528/529/530
Response to Request for Additional Information Regarding Fourth 10-Year Interval Pump and Valve Inservice Testing Program Relief Requests

In Reference 1, APS transmitted the relief requests for Palo Verde Nuclear Generating Station (PVNGS) pump and valve inservice testing (IST) program for the fourth 10-year interval for Units 1, 2, and 3. In Reference 2, APS withdrew relief requests GRR-01 and GRR-02, of Reference 1, which related to the use of the 2012 Edition of the American Society of Mechanical Engineers (ASME) Operation and Maintenance (OM) Code and Code Case OMN-20, *Inservice Test Frequency*. At the time, rulemaking on the 2012 edition of the code was delayed. In Reference 3, APS requested that the remaining relief requests be reviewed pursuant to the 2012 ASME OM Code, after rulemaking on the 2012 code was complete.

The Nuclear Regulatory Commission (NRC) staff provided a request for additional information (RAI) to APS by email dated August 31, 2017. The enclosure to this letter contains the responses to the RAI.

No new commitments are being made in this submittal.

If you have any questions about this response, please contact Nuclear Regulatory Affairs Section Leader Matthew Cox at (623) 393-5753.

Sincerely,

Hugo W. Acker FOR MARIA LACAL

MLL/MDD/MSC/sma

Enclosure: APS Response to NRC Request for Additional Information Regarding Fourth 10-Year Interval Pump and Valve Inservice Testing Program Relief Requests

cc:	K. M. Kennedy	NRC Region IV Regional Administrator
	S. P. Lingam	NRC NRR Project Manager for PVNGS
	M. M. Watford O'Banion	NRC NRR Project Manager
	C. A. Peabody	NRC Senior Resident Inspector for PVNGS

Enclosure

APS Response to NRC Request for Additional Information Regarding Fourth 10-Year Interval Pump and Valve Inservice Testing Program Relief Requests

Introduction

By letter dated February 23, 2017 (Reference 1), and supplemented by letters dated March 10, 2017 (Reference 2) and August 16, 2017 (Reference 3), Arizona Public Service Company (APS) submitted relief requests for the Palo Verde Nuclear Generating Station (PVNGS) pump and valve inservice testing (IST) program for the fourth 10-year interval for Units 1, 2, and 3.

These relief requests are required for the fourth 10-year IST interval. The majority of these relief requests were previously authorized for the PVNGS third 10-year interval by the Nuclear Regulatory Commission (NRC) staff in a letter dated April 24, 2008 [Agencywide Documents Access and Management System (ADAMS) Accession No. ML081050003]. The relief requests that were not previously authorized are GRR-01, GRR-02, and PRR-06. In Reference 2, APS formally withdrew relief requests GRR-01 and GRR-02 of Reference 1, which relate to the use of the 2012 Edition of the American Society of Mechanical Engineers (ASME) Operation and Maintenance (OM) Code and Code Case OMN-20, *Inservice Test Frequency*, which is an alternative to the test frequency specifications of the ASME OM Code. PRR-06 requests an alternative vibration measuring method from the requirements of the ASME OM Code.

Federal Register Notice (82 FR 136), dated July 18, 2017, published the relevant final rule that incorporated the 2012 Edition of the ASME OM Code into 10 CFR 50.55a, including Code Case OMN-20, with an effective date of August 17, 2017.

In Reference 3, APS requested authorization to use the 2012 Edition of the ASME OM Code fourth 10-year IST interval and requested that the remaining relief requests be reviewed pursuant to the 2012 ASME OM Code. The PVNGS fourth interval pump and valve IST program, which begins on January 15, 2018 for all three units, has been developed in accordance with the 2012 Edition of the ASME OM Code.

The NRC staff provided a request for additional information (RAI) by email dated August 31, 2017. This enclosure contains the clarifying information in response to the RAI. The NRC RAI is stated first, followed by the APS response.

RAI PRR-03-1

It is stated in the alternative request that the design flow for the Low Pressure Safety Injection (LPSI) pumps is 4,200 gallons per minute (gpm). The proposed alternative is to conduct the Group A test for the LPSI pumps at mini-flow conditions using the minimum flow recirculation line fixed resistance of approximately 180 gpm to establish the specified reference point. Please confirm that the flow rate of 180 gpm is above the manufacturer's minimum continuous stable flow for the LPSI pumps.

Response

LPSI pump operation at the miniflow condition is managed and controlled to preclude pump degradation during testing because flow is below the manufacturer's minimum continuous stable flow of 2400 gpm.

Letter 161-04032, dated July 1, 1991, (ADAMS Accession No. 9107120005) documents the APS response to NRC Bulletin 88-04, *Potential Safety-Related Pump Loss*. Action number 3 of the bulletin requested an evaluation of the adequacy of the minimum flow bypass lines

for safety-related centrifugal pumps with respect to damage resulting from operation and testing in the minimum flow mode. Attachment 1 to the letter states in part:

> "The vendor's evaluation of the Safety Injection pumps indicated that the specified miniflow rates are below the minimum continuous stable flow point; however, the vendor never intended and recommends against running the pumps on miniflow for extended periods of time. At PVNGS, administrative controls and operating procedures are such that the Safety Injection pumps are not operated for extended periods of time at miniflow in accordance with the vendor technical manual recommendations."

Attachment 2 states in part:

> "Ingersoll-Rand verified the Safety Injection miniflow rates are sufficient to ensure no pump damage from low flow operation for short periods of time."

The NRC staff commented that the APS response to Bulletin 88-04 is considered complete, as documented in a letter dated October 11, 1989 (ADAMS Accession No. 8910250222).

Current operating and inservice testing procedures, design calculations, and vendor technical guidance were reviewed to confirm the stated controls remain in effect. It was determined that the pumps continue to be operated and tested consistent with the Bulletin 88-04 response.

Under the IST program, the LPSI pump quarterly Group A test procedure limits pump operating time based on flow rate. Operation at the 180 gpm miniflow rate is limited to 1 hour, providing margin to the vendor guidance. The manufacturer's minimum flow for safe operation is 100 gpm for less than 1 hour. Operators ensure pump run-time limits are met during quarterly testing at the minimum flow condition.

APS procedures reflect awareness that LPSI pump minimum recirculation flow lines are sized to allow pump operation on a time-limited basis. Miniflow test flow rates are greater than the manufacturer-specified minimum flow for safe operation for a limited duration. Test procedures limit pump operation time at miniflow conditions, which meets manufacturer guidance to preclude pump degradation during testing. LPSI pump testing on minimum flow has been controlled in this manner since the 1990s. Relief requests identical to PRR-03 have been approved by the NRC staff for previous IST intervals. APS desires to continue testing at this condition to ensure future performance data can be trended with respect to more than 20 years of test data history.

RAI PRR-04-1

It is stated in the alternative request that the design flow for the High Pressure Safety Injection (HPSI) pumps is 815 gpm. The proposed alternative is to conduct the Group B test for the HPSI pumps at mini-flow conditions using the minimum flow recirculation line fixed resistance of approximately 170 gpm to establish the specified reference point. Please confirm that the flow rate of 170 gpm is above the manufacturer's minimum continuous stable flow for the HPSI pumps.

Response

HPSI pump operation at the miniflow condition is managed and controlled to preclude pump degradation during testing because flow is below the manufacturer's minimum continuous stable flow of 225 gpm.

As previously described in the response to RAI PRR-03-1, APS operating and inservice testing procedures, design calculations, and vendor technical guidance were reviewed to confirm implementation of the Bulletin 88-04 response statements. It was determined that the pumps continue to be operated and tested consistent with the Bulletin 88-04 response.

Under the IST program, the HPSI pump quarterly Group B test procedure limits pump operating time based on flow rate. Operation at the 170 gpm miniflow rate is limited to 1 hour, providing margin to the vendor guidance. The manufacturer's minimum flow for safe operation of less than 1 hour is 85 gpm. Operators ensure pump run-time limits are met during quarterly testing at the minimum flow condition.

APS procedures reflect awareness that HPSI pump minimum recirculation flow lines are sized to allow pump operation on a time-limited basis. Miniflow test flow rates are greater than the manufacturer-specified minimum flow for safe operation for a limited duration. Relief requests identical to PRR-04 have been approved by NRC in previous IST intervals. APS desires to continue testing at this condition to ensure future performance data can be trended with respect to more than 20 years of test data history.

RAI PRR-05-1

It is stated in the alternative request that the design flow for the containment spray (CS) pumps is 3890 gpm. The proposed alternative is to conduct the Group A test for the CS pumps at mini-flow conditions using the minimum flow recirculation line fixed resistance of approximately 190 gpm to establish the specified reference point. Please confirm that the flow rate of 190 gpm is above the manufacturer's minimum continuous stable flow for the CS pumps.

Response

CS pump operation at the miniflow condition is managed and controlled to preclude pump degradation during testing because flow is below the manufacturer's minimum continuous stable flow of 2100 gpm.

As previously described in the response to RAI PRR-03-1, APS operating and inservice testing procedures, design calculations, and vendor technical guidance were reviewed to confirm implementation of the Bulletin 88-04 response statements. It was determined that the pumps continue to be operated and tested consistent with the Bulletin 88-04 response.

Under the Inservice Testing Program, the CS pump quarterly Group A test procedure limits pump operating time based on flow rate. Operation at the 190 gpm miniflow rate is limited to 1 hour, providing margin to the vendor guidance. The manufacturer's minimum flow for safe operation is 150 gpm for less than 1 hour. Operators ensure pump run-time limits are met during quarterly testing at minimum flow conditions.

APS procedures demonstrate awareness that CS pump minimum recirculation flow lines are sized to allow pump operation on a time-limited basis. Miniflow test flow rates are greater than the manufacturer-specified minimum flow for safe operation for a limited duration. Relief requests identical to PRR-05 have been approved by NRC in previous IST intervals. APS desires to continue testing at this condition to ensure future performance data can be trended with respect to more than 20 years of test data history.

References

1. Arizona Public Service Company (APS) letter number 102-07436, *Fourth 10-Year Interval Pump and Valve Inservice Testing Program Relief Requests GRR-01, GRR-02, PRR-01, PRR-02, PRR-03, PRR-04, PRR-05, and PRR-06,* dated February 23, 2017 (ADAMS Accession Number ML17054D687)

2. APS letter number 102-07459, *Supplement Regarding Fourth 10-Year Interval Pump and Valve Inservice Testing Program Relief Requests PRR-01, PRR-02, PRR-03, PRR-04, PRR-05, and PRR-06,* dated March 10, 2017 (ADAMS Accession Number ML17069A319)

3. APS letter number 102-07563, *Fourth 10-Year Interval Pump and Valve Inservice Testing Program Relief Requests PRR-01, PRR-02, PRR-03, PRR-04, PRR-05, and PRR-06,* Adoption of 2012 Edition of the American Society of Mechanical Engineers Operation and Maintenance Code dated August 16, 2017 (ADAMS Accession Number ML17228A795)