



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

August 3, 2009

Mr. Randall K. Edington  
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, UNIT 3 – RELIEF  
REQUEST NO. PRR-08, REVISION 1, HIGH PRESSURE SAFETY INJECTION  
PUMP B TEST ALTERNATIVE (TAC NO. ME1346)

Dear Mr. Edington:

By letter dated May 22, 2009, as revised by letter dated June 2, 2009, Arizona Public Service Company (APS, the licensee) requested authorization to use an alternative to the inservice test requirements of the 2001 Edition through the 2003 Addenda of the American Society of Mechanical Engineers (ASME) *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code). The proposed alternative in relief request PRR-08, Revision 1, is for the Palo Verde Nuclear Generating Station (PVNGS), Unit 3, High Pressure Safety Injection (HPSI) pump B. The licensee requested authorization to use alternative flow rate and instrumentation provisions on a one-time basis for the performance of a comprehensive pump test, for the duration of the 15<sup>th</sup> operating cycle of Unit 3.

APS requested verbal approval of relief request PRR-08 from NRC by May 22, 2009, in order to support the restart of the Unit 3 reactor. Two conference calls were held between NRC and APS on May 22, 2009, and the staff granted verbal authorization of the requested alternative, as documented in a conference call summary dated June 2, 2009. The NRC staff found the alternative testing provisions acceptable, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), paragraph 50.55a(a)(3)(ii), and the basis for that finding is documented in the enclosed safety evaluation. On the basis of the information submitted by the licensee, the staff concluded that the proposed alternative provides reasonable assurance of the operational readiness of HPSI pump B, and that compliance with the additional requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the staff has authorized this alternative for the duration of the 15<sup>th</sup> operating cycle for PVNGS, Unit 3.

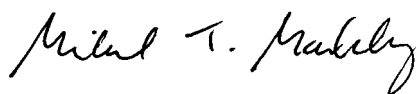
All other ASME OM Code requirements for which relief has not been specifically requested and approved remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

R. Edington

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A copy of the safety evaluation is enclosed. If you have any questions, please contact Randy Hall at (301) 415-4032 or via email at [randy.hall@nrc.gov](mailto:randy.hall@nrc.gov).

Sincerely,

A handwritten signature in black ink that reads "Michael T. Markley". The signature is written in a cursive style with a large, stylized initial "M".

Michael T. Markley, Chief  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. STN 50-530

Enclosure:  
Safety Evaluation

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UNITED STATES  
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST PRR-08, REVISION 1

HIGH PRESSURE SAFETY INJECTION PUMP B TEST ALTERNATIVE

ARIZONA PUBLIC SERVICE COMPANY, ET AL.

PALO VERDE NUCLEAR GENERATING STATION, UNIT 3

DOCKET NO. STN 50-530

1.0 INTRODUCTION

By letter dated May 22, 2009, as revised by letter dated June 2, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML091460739 and ML091630449, respectively), Arizona Public Service Company (APS, the licensee), requested authorization to use an alternative to the inservice test requirements of the 2001 Edition through the 2003 Addenda of the American Society of Mechanical Engineers (ASME) *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code). The proposed alternative in relief request PRR-08, Revision 1, is for the Palo Verde Nuclear Generating Station (PVNGS), Unit 3, High Pressure Safety Injection (HPSI) pump B. The licensee requested authorization to use an alternative flow rate and instrumentation provisions on a one-time basis during a comprehensive pump test for the 15<sup>th</sup> operating cycle of Unit 3. The licensee requested authorization to use this alternative in accordance with Title 10 of the *Code of Federal Regulations*, Section 50.55a (10 CFR 50.55a). On May 22, 2009, the U.S. Nuclear Regulatory Commission (NRC) staff granted verbal authorization of the requested alternative, as documented in a conference call summary dated June 2, 2009 (ADAMS Accession No. ML091460722).

2.0 REGULATORY EVALUATION

Paragraph 10 CFR 50.55a(f), "Inservice testing requirements," requires, in part, that ASME Class 1, 2, and 3 components must meet the requirements of the ASME OM Code and applicable addenda, except where alternatives have been authorized pursuant to paragraphs (a)(3)(i) and (a)(3)(ii) of 10 CFR 50.55a.

In proposing alternatives, a licensee must demonstrate that the proposed alternative provides an acceptable level of quality and safety or that compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The NRC is authorized under 10 CFR 50.55a to approve alternatives to ASME OM Code requirements upon making necessary findings. NRC guidance contained in NUREG-1482, Revision 1, "Guidance for Inservice Testing at Nuclear Power Plants," dated January 2005, provides alternatives to

Enclosure

ASME OM Code requirements which are acceptable. The licensee proposed an alternative in relief request PRR-08, Revision 1, in accordance with 10 CFR 50.55a(a)(3)(ii) because compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

### 3.0 TECHNICAL EVALUATION

#### 3.1 ASME OM Code Requirements

ASME OM Code, Subsection ISTB, Paragraph ISTB-3310, 2001 Edition through 2003 Addenda, states that when a reference value or set of values may have been affected by repair of a pump, previous reference values shall be reconfirmed by a comprehensive pump test before declaring the pump operable.

ASME OM Code, Subsection ISTB, Paragraph ISTB-3300(e)(1), 2001 Edition through 2003 Addenda, states that reference values shall be established within  $\pm 20$  percent of pump design flow rate for the comprehensive pump test.

ASME OM Code, Subsection ISTB, Table ISTB-3500-1 states that flow rate instrument accuracy for the comprehensive pump test shall be accurate to  $\pm 2$  percent of actual flow.

#### 3.2 Proposed Alternative Testing

The licensee discovered that the Unit 3 HPSI pump B mechanical seal was leaking during preparations to restart the reactor (enter Mode 4) following the spring 2009 refueling outage. The licensee determined that an additional comprehensive pump test was required by the ASME Code following the repair of the leaking mechanical seal. The flow rate required for HPSI pump B during a comprehensive pump test is 832 to 1,248 gallons per minute (gpm). A comprehensive pump test was conducted earlier in the refueling outage with no leakage identified at the mechanical seal. HPSI pump B was aligned to the defueled reactor vessel during that test and the proper flow rate was established for that test. At the time the licensee discovered the leaking seal, the HPSI system was being used to fill the safety injection tanks, with the reactor refueled and the reactor vessel head in place. The licensee stated that it would constitute a hardship to align HPSI pump B to the reactor vessel from that plant configuration (Mode 5) to conduct the test at the required flow rate. Either the typical test configuration would need to be re-established (the reactor vessel head would need to be removed again and all the fuel would also need to be removed from the reactor vessel again), or the HPSI pump B would need to be aligned to the reactor vessel with the head remaining in place, which would be a unique system alignment (requiring a temporary procedure change and associated training of control room operators, who may need to react quickly in the event of a flow imbalance in the reactor coolant system). For the proposed alternative, HPSI pump B can be aligned to the refueling water tank (RWT) in order to perform the comprehensive pump test. The licensee estimated that the HPSI pump B flow rate of 750 gpm is attainable when aligned to the RWT and, therefore, proposed to perform a comprehensive pump test at a flow rate of 750 gpm on a one-time basis.

The flow instrumentation used during HPSI pump comprehensive tests performed during refueling outages is accurate to  $\pm 2$  percent of actual flow. However, this instrumentation is not

located in the flow path from the HPSI pump to the RWT. The existing flowmeter located in the flow path from the HPSI pump to the RWT is accurate to  $\pm 5$  percent of actual flow. The licensee proposed to use the existing flow instrumentation in the HPSI pump flow path to the RWT that is accurate to  $\pm 5$  percent of actual flow during the comprehensive pump test on a one-time basis.

### 3.3 Basis for the Alternative

The licensee stated that the purpose of performing the comprehensive pump test following seal and bearing replacement is to determine if the vibration reference values were impacted to the degree that would require the acceptance criteria to be adjusted. This determination can be made from the results of testing at flow rates lower than design flow of 832 to 1248 gpm. According to the licensee, performing the comprehensive test at 750 gpm with instrumentation accurate to  $\pm 5$  percent of actual flow provides sufficient vibration data to adequately assess HPSI pump B operation. In the licensee's letter dated June 2, 2009, APS indicated that the actual flow rate attained for the alternative test was 840 gpm, and that the data obtained from the pump vibration spectrum analysis was well within the expected range and was acceptable.

### 3.4 NRC Staff Evaluation of Proposed Alternative

ASME OM Code, Subsection ISTB, Paragraph ISTB-3310, 2001 Edition through 2003 Addenda, requires licensees to determine if reference values need to be established or verified following pump repair activities. The licensee determined that mechanical seal and bearing replacement on HPSI pump B does not adversely impact the hydraulic characteristics (including flow rate) of the pump due to the limited scope of work and the controls used during the maintenance. The controls included maintaining the pump shaft in place during pump seal and outboard bearing replacement. Therefore, only HPSI pump B vibration reference values are required to be established or verified during the comprehensive pump test that is performed following seal and bearing replacement. The licensee stated that it will conduct the HPSI pump B comprehensive test following seal repair at 750 gpm or a higher flow rate, if possible, in the RWT alignment as follows:

- Test data will be taken during maximum flow and mini-flow conditions and compared to data obtained during the comprehensive pump test conducted during the refueling outage that was just completed to provide assurance of acceptable pump operation.
- Vibration frequency spectrum analysis will be conducted during HPSI pump B comprehensive and Group B surveillance tests performed during the current operating cycle and analyzed to ensure that there are not indications of unacceptable pump performance.
- Vibration data will be collected during HPSI pump B comprehensive and quarterly Group B surveillance tests conducted during the current operating cycle and analyzed to provide assurance of acceptable pump operation.

The NRC staff concludes that a comprehensive pump test at a flow rate of 750 gpm with instrumentation accurate to  $\pm 5$  percent of actual flow following Unit 3 HPSI pump B seal and

outboard bearing replacement as proposed by the licensee is an acceptable alternative to the comprehensive pump test requirements of ASME OM Code Paragraphs ISTB-3310 and ISTB-3300(e)(1), and Table ISTB-3500-1. Flow rates and instrumentation used during the test are adequate to provide analysis of pump vibration levels. The alternative test provides adequate assurance of the operational readiness of the Unit 3 HPSI pump B. Vibration frequency spectrum analysis exceeds ASME OM Code requirements and provides additional assurance that HPSI pump B is operationally ready. Vibration frequency spectrum analysis ensures that the maintenance performed does not result in a condition that is detrimental to pump health. The collection of vibration data during the quarterly Group B surveillance tests also exceeds ASME OM Code requirements and provides additional assurance that HPSI pump B is operationally ready. Based on the above, the NRC staff concludes that the proposed alternative is acceptable.

#### 4.0 CONCLUSION

The NRC staff has reviewed the licensee's basis and concludes that the licensee's proposed alternative provides reasonable assurance of the operational readiness of HPSI pump B, and that compliance with the additional requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, in accordance with 10 CFR 50.55a(a)(3)(ii), the NRC staff authorizes the alternative testing provisions of Relief Request PPR-08, Revision 1, on a one-time basis for the Unit 3 HPSI pump B comprehensive pump test, for the duration of the 15<sup>th</sup> operating cycle for PVNGS, Unit 3.

All other ASME OM Code requirements for which relief has not been specifically requested and approved remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: Stephen G. Tingen

Date: August 3, 2009

R. Edington

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A copy of the safety evaluation is enclosed. If you have any questions, please contact Randy Hall at (301) 415-4032 or via email at [randy.hall@nrc.gov](mailto:randy.hall@nrc.gov).

Sincerely,

/RA/

Michael T. Markley, Chief  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. STN 50-530

Enclosure:  
Safety Evaluation

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**ADAMS Accession No.: ML091900274** (\*) Concurrence via SE (\*\*) See previous concurrence

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