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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 119 TO FACILITY OPERATING LICENSE NO. NPF-74

ARIZONA PUBLIC SERVICE COMPANY, ET AL.

PALO VERDE NUCLEAR GENERATING STATION, UNIT NO.3

DOCKET NO. STN 50-530

1.0 INTRODUCTION

By letter dated October 6, 1998, Arizona Public Service Company (APS or the licensee) requested changes to the Technical Specifications (Appendix A to Facility Operating License No. NPF-74) for the Palo Verde Nuclear Generating Station (PVNGS), Unit 3. APS submitted this request on behalf of itself, the Salt River Project Agricultural Improvement and Power District, Southern California Edison Company, El Paso Electric Company, Public Service Company of New Mexico, Los Angeles Department of Water and Power, and Southern California Public Power Authority.

The proposed changes would modify TS 3.3.1, "Reactor Protective System (RPS) Instrumentation -- Operating," and TS 3.3.2, "Reactor Protective System (RPS) Instrumentation – Shutdown," to clarify the power level threshold at which certain RPS instrumentation trips must be enabled and may be bypassed, and clarify that this level is a percentage of the neutron flux at rated thermal power (RTP). The bypass power level, 1E-4% RTP, would be specified as logarithmic power instead of thermal power. The licensee requested the staff process this amendment request as an exigent amendment in accordance with 10 CFR 50.91(a)(6).

2.0 DISCUSSION

Footnotes (a) and (b) in TS Table 3.3.1, "Reactor Protective System (RPS) Instrumentation – Operating," and footnote (d) in TS 3.3.2 Table, "Reactor Protective System (RPS) Instrumentation – Shutdown," identify operating bypass permissive and enable bistable values. The proposed amendment to the PVNGS Unit 3 TS would replace the words "THERMAL POWER" with "logarithmic power" for the 1E-4% rated thermal power (RTP) level threshold in these footnotes, and also in surveillance requirement SR 3.3.1.7 Note 2. The proposed amendment would also replace "RTP" with "NRTP," in Table 3.3.1-1 footnotes (a) and (b), surveillance requirement SR 3.3.1.7 Note 2, and Table 3.3.2-1 footnotes (c) and (d). In addition, the proposed amendment would add a definition for NRTP (nuclear rated thermal power) in TS Section 1.1 as the indicated neutron flux at RTP, and specify NRTP as the "ALLOWABLE VALUE" parameter for the logarithmic power level – high trip in Table 3.3.1-1.

TS 3.3.1, "Reactor Protective System (RPS) Instrumentation – Operating," provides for the operability, during plant operation, of instruments necessary to initiate a reactor trip that would protect the plant against anticipated operational occurrences (AOOs) and assist the engineered safety features (ESF) systems in mitigating accidents. Those instruments are specified in Table 3.3.1-1.

The logarithmic power level - high trip specified in TS Table 3.3.1-1 is designed to protect the integrity of the fuel cladding and help protect the reactor coolant pressure boundary in the event of an unplanned criticality from a shutdown condition. The purpose of footnote (a) is to allow the logarithmic power trip to be bypassed when neutron power is above 1E-4% neutron RTP, and require the trip to be automatically enabled when neutron power is at or below 1E-4% neutron RTP. This is permitted because the logarithmic power trip is not needed unless neutron power (indicated by logarithmic power) is 1E-4% neutron RTP or below. As described in the Bases for TS 3.3.1, other trips provide adequate protection for events originating when power is above 1E-4% RTP.

The local power density (LPD) - high and departure from nucleate boiling ratio (DNBR) - low trips in TS Table 3.3.1-1 are designed to provide plant protection during certain AOOs and assist the ESF systems in the mitigation of certain accidents, as described in the Bases for TS 3.3.1. The purpose of footnote (b) is to allow the LPD-high and DNBR-low trips to be bypassed when neutron power is below 1E-4% neutron RTP, and require the trips to be automatically enabled when neutron power (indicated by logarithmic power) is at or above 1E-4% neutron RTP. This is permitted because, as described in the Bases for TS 3.3.1, plant conditions when power is below 1E-4% RTP do not warrant the trip protection of these trips.

Surveillance Requirement (SR) 3.3.1.7 requires a channel functional test be performed on each RPS channel at a frequency of 92 days to assure that the instruments will be operable. Note 2 of this SR allows the functional test of the logarithmic power level channels to be deferred until two hours after reducing power below 1E-4% RTP, since the logarithmic power trip is not needed unless neutron power (indicated by logarithmic power) is at 1E-4% neutron RTP or below.

TS 3.3.2, "Reactor Protective System (RPS) Instrumentation – Shutdown," provides for the operability, during plant shutdown, of instruments necessary to initiate a reactor trip that would protect the plant against AOOs and assist the ESF systems in mitigating accidents. Those instruments are specified in Table 3.3.2-1.

The logarithmic power level - high trip specified in TS Table 3.3.2-1 is designed to protect the integrity of the fuel cladding and help protect the reactor coolant pressure boundary in the event of an unplanned criticality from a shutdown condition. The purpose of the footnote (d) is to allow the high logarithmic power trip to be bypassed when neutron power is above 1E-4% neutron RTP, and require the trip to be automatically enabled when neutron power is at or below 1E-4% neutron RTP. This is permitted because the logarithmic power trip is not needed unless neutron power (indicated by logarithmic power) is 1E-4% neutron RTP or below.

3.0 EVALUATION

As stated in the previous section, the proposed TS amendment would replace the words "THERMAL POWER" with "logarithmic power" for the 1E-4% RTP level threshold in Table 3.3.1-1 footnotes (a) and (b), SR 3.3.1.7 Note 2, and in Table 3.3.2-1 footnote (d). As described above, the purpose of the 1E-4% neutron RTP threshold is to (1) specify the power, below which, the logarithmic power level trip is required to be operable and surveilled, and (2) specify the power, above which, the LPD and DNBR trips are required to be operable. For all of these purposes, the appropriate power threshold should be logarithmic power, which is the power indicated on the logarithmic nuclear instrumentation, and not thermal power. Thermal power is defined in TS Section 1.1 as the total reactor heat transfer rate to the reactor coolant, and would include decay heat. Thermal power would therefore not drop to 1E-4% RTP for a number of years after shutdown, and would not provide the plant protective function correlation required at 1E-4% neutron RTP. Since "THERMAL POWER" will not decrease to less than or equal to 1E-4% RTP for normal duration plant outages, TS Table 3.3.1-1, note "b," would require the RCS Flow/LPD/DNBR trip bypasses to be removed during planned startup when the plant enters Mode 2. This condition is expected to produce a trip signal as soon as the trip bypasses are removed. Therefore strict adherence to the notes as currently written would preclude plant startups.

The PVNGS Updated Final Safety Analysis Report (UFSAR) Section 7.2.1.1.2.3 states that the excore neutron flux instrumentation provides the input signal to the RPS for the logarithmic power-high trip and to the core protection calculator (CPC) for use in calculations for LPD-high and DNBR-low trips. Further, UFSAR Section 15.4.1.3 states that a trip generated at 1E-4% power level (when the CPC bypass is automatically removed) would cause a decrease in fission (neutron) power before the point of adding sensible heat is reached. Also, UFSAR Section 15.4.1.4 states that a reactor trip on high logarithmic power is generated before core power reaches the point of adding sensible heat. In all of these sections, it is implicit that the power being described is neutron flux power, as indicated by logarithmic power, and not thermal power, which is defined as heat transfer from the reactor core to the coolant. In addition, the TS Bases for LCO 3.3.1 for the LPD–high trip and the DNBR–low trip state that the 1E-4% RTP threshold level is "sensed by the logarithmic nuclear instrumentation."

Therefore, logarithmic power, which measures neutron flux, does provide the plant protective function correlation required at 1E-4% neutron RTP for the required trips as required by safety analyses. The logarithmic power level of 1E-4% neutron RTP nominally correlates to the neutron flux measured by the excore neutron instrumentation that is 1E-4% of the neutron flux at 100% RTP (3876 MWt) measured by the excore neutron instrumentation. Since neutron flux is, by design, the correct input process variable for the operating bypass permissive and enable bistable values described in footnotes (a) and (b) of TS Table 3.3.1-1, footnote (d) of TS Table 3.3.2-1, and Note 2 to SR 3.3.1.7, the change to replace "THERMAL POWER" with logarithmic power is acceptable to the staff.

The proposed amendment would also replace "RTP" with "NRTP," in Table 3.3.1-1 footnotes (a) and (b), SR 3.3.1.7 Note 2, and Table 3.3.2-1 footnotes (c) and (d). A definition would be added for NRTP (nuclear rated thermal power) in Section 1.1 as the indicated neutron flux at RTP. These clarifications will reflect the fact that the logarithmic power level of 1E-4% is not a percentage of the "total reactor core heat transfer rate to the reactor coolant of 3876 MWt," as RTP is defined in Section TS 1.1, but is instead a percentage of the indicated neutron flux at RTP. This proposed change is acceptable to the staff.

4.0 EXIGENT CIRCUMSTANCES

The Commission's regulations, 10 CFR 50.91, contain provisions for issuance of amendments when the usual 30-day public notice period cannot be met. One type of special exception is an exigency. An exigency is a case where prompt action is required (before the expiration of a 30-day period comment period).

Under such circumstances, the Commission notifies the public in one of two ways: by issuing a Federal Register notice providing an opportunity for hearing and allowing at least two weeks for prior public comments, or by issuing a press release discussing the proposed changes, using the local media. In this case, the Commission used both approaches, since it was not known until after the Federal Register notice had been published that the 14 days were not available for public comments.

The exigent circumstances for this TS amendment request exist because the current "THERMAL POWER" and "RATED THERMAL POWER" (RTP) wording in the PVNGS TS, when interpreted literally in its application in TS Table 3.3.1-1 footnote (b), could prevent the resumption of operation of the Unit following its current refueling outage. This exigent situation could not have been avoided because, although this wording has existed in the PVNGS TS since initial licensing, it was not identified as a potential source of conflict until APS learned on or about September 24, 1998, of emergency TS amendment requests by Southern California Edison Company, for the San Onofre Nuclear Generating Station, and Entergy Corporation, for the Waterford Nuclear Station.

The literal interpretation of "THERMAL POWER" in TS Table 3.3.1-1 footnote (b) could prevent the return to power operation of a shutdown reactor. This footnote specifies that the local power density–high trip and departure from nucleate boiling ratio-low trip may be bypassed when thermal power is less than 1E-4% RTP, and that the bypass must be automatically removed when thermal power is at or above 1E-4% RTP. Since thermal power, as defined in TS Section 1.1, includes decay heat, and decay heat would remain above 1E-4% RTP for a considerable time after shutdown, the literal interpretation of thermal power would effectively prevent the local power density and departure from nucleate boiling ratio trips from being bypassed during a normal outage, which would prevent low power testing and subsequent startup.

The NRC staff has reviewed the circumstances surrounding the amendment request and finds that the circumstances could not have been avoided and that the licensee made a timely request for the amendment. Therefore, the staff finds that the license amendment may be issued in an exigent manner pursuant to 10 CFR 50.91(a)(6).

5.0 FINAL NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

The Commission's regulations in 10 CFR 50.92 state that the Commission may make a final determination that a license amendment involves no significant hazards considerations if operation of the facility in accordance with the amendment would not (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety.

1. The proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

The proposed change would replace the words "THERMAL POWER" with "logarithmic power" for the 1E-4% rated thermal power (RTP) level threshold in Table 3.3.1-1 footnotes (a) and (b), SR 3.3.1.7 Note 2, and Table 3.3.2-1 footnote (d) for the reactor protective system (RPS) instrumentation. The purpose of the 1E-4% RTP threshold is to (1) specify the power, below which, the logarithmic power level trip is required to be operable and surveilled, and (2) specify the power, above which, the local power density (LPD) and departure from nucleate boiling ratio (DNBR) trips are required to be operable. For these purposes, the appropriate power threshold should be logarithmic power, which is the power indicated on the logarithmic nuclear instrumentation, and not thermal power. Thermal power is defined in TS Section 1.1 as the total reactor heat transfer rate to the reactor coolant, and would include decay heat. Thermal power would therefore not drop to 1E-4% RTP for a considerable period of time after shutdown, and would not provide the plant protective function correlation required at 1E-4% neutron RTP. However, logarithmic power, which is indicated by neutron flux, does provide the plant protective function correlation required at 1E-4% neutron RTP for the required reactor trips as required by safety analyses. The logarithmic power level of 1E-4% neutron RTP nominally correlates to the neutron flux measured by the excore neutron instrumentation that is 1E-4% of the neutron flux at 100% RTP (3876 MWt) measured by the excore neutron instrumentation.

The proposed editorial amendment would also replace "RTP" with "NRTP," in Table 3.3.1-1 footnotes (a) and (b), SR 3.3.1.7 Note 2, and Table 3.3.2-1 footnotes (c) and (d). A definition would be added for NRTP (nuclear rated thermal power) in Section 1.1 as the indicated neutron flux at RTP. These editorial clarifications will reflect the fact that the logarithmic power level of 1E-4% is not a percentage of the "total reactor core heat transfer rate to the reactor coolant of 3876 MWt," as RTP is defined in Section 1.1, but is instead a percentage of the indicated neutron flux at RTP.

An editorial change is also proposed to specify NRTP as the "ALLOWABLE VALUE" parameter for the high logarithmic power level trip setpoint in Table 3.3.1-1 to correct the unintended omission of the trip setpoint parameter during preparation of the Improved Technical Specifications. This change will fill in the omitted parameter with the correct parameter of NRTP that is also consistent with the high logarithmic power trip setpoint parameter in Table 3.3.2-1.

These changes do not constitute a physical change to the unit or make changes in the RPS instrumentation setpoints, system logic or manual actuation. In addition, these changes do not alter physical plant equipment or the way in which plant equipment is operated. This change is editorial in that it corrects the TS wording to match the appropriate power parameter that was originally intended and required by safety analyses, and that has been implemented since original licensing of the PVNGS plants. Therefore, these changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. The proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

The proposed change would replace the words "THERMAL POWER" with "logarithmic power" for the 1E-4% RTP level threshold in Table 3.3.1-1 footnotes (a) and (b), SR 3.3.1.7 Note 2, and Table 3.3.2-1 footnote (d) for the RPS instrumentation. The purpose of the 1E-4% RTP threshold is to (1) specify the power, below which, the logarithmic power level trip is required to be operable and surveilled, and (2) specify the power, above which, the LPD and DNBR trips are required to be operable. For these purposes, the appropriate power threshold should be logarithmic power, which is the power indicated on the logarithmic nuclear instrumentation, and not thermal power. Thermal power is defined in TS Section 1.1 as the total reactor heat transfer rate to the reactor coolant, and would include decay heat. Thermal power would therefore not drop to 1E-4% RTP for a considerable period of time after shutdown, and would not provide the plant protective function correlation required at 1E-4% neutron RTP. However, logarithmic power, which is indicated by neutron flux, does provide the plant protective function correlation required at 1E-4% neutron RTP for the required reactor trips as required by safety analyses.

The proposed editorial amendment would also replace "RTP" with "NRTP," in Table 3.3.1-1 footnotes (a) and (b), SR 3.3.1.7 Note 2, and Table 3.3.2-1 footnotes (c) and (d). A definition would be added for NRTP (nuclear rated thermal power) in Section 1.1 as the indicated neutron flux at RTP. These editorial clarifications will reflect the fact that the logarithmic power level of 1E-4% is not a percentage of the "total reactor core heat transfer rate to the reactor coolant of 3876 MWt," as RTP is defined in Section 1.1, but is instead a percentage of the indicated neutron flux at RTP.

An editorial change is also proposed to specify NRTP as the "ALLOWABLE VALUE" parameter for the high logarithmic power level trip setpoint in Table 3.3.1-1 to correct the unintended omission of the trip setpoint parameter during preparation of the Improved Technical Specifications. This change will fill in the omitted parameter with the correct parameter of

NRTP that is also consistent with the high logarithmic power trip setpoint parameter in Table 3.3.2-1.

These changes do not constitute a physical change to the unit or make changes in the RPS instrumentation setpoints, system logic or manual actuation. In addition, these changes do not alter physical plant equipment or the way in which plant equipment is operated. The proposed change does not introduce any new modes of plant operation or new accident precursors. This change is editorial in that it corrects the TS wording to match the appropriate power parameter that was originally intended and required by safety analyses, and that has been implemented since original licensing of the PVNGS plants. Therefore, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. The proposed change does not involve a significant reduction in a margin of safety.

The proposed change would replace the words "THERMAL POWER" with "logarithmic power" for the 1E-4% RTP level threshold in Table 3.3.1-1 footnotes (a) and (b), SR 3.3.1.7 Note 2, and Table 3.3.2-1 footnote (d) for the RPS instrumentation. The purpose of the 1E-4% RTP threshold is to (1) specify the power, below which, the logarithmic power level trip is required to be operable and surveilled, and (2) specify the power, above which, the LPD and DNBR trips are required to be operable. For these purposes, the appropriate power threshold should be logarithmic power, which is the power indicated on the logarithmic nuclear instrumentation, and not thermal power. Thermal power is defined in TS Section 1.1 as the total reactor heat transfer rate to the reactor coolant, and would include decay heat. Thermal power would therefore not drop to 1E-4% RTP for a considerable period of time after shutdown, and would not provide the plant protective function correlation required at 1E-4% neutron RTP. However, logarithmic power, which is indicated by neutron flux, does provide the plant protective function correlation required at 1E-4% neutron RTP for the required reactor trips as required by safety analyses.

The proposed editorial amendment would also replace "RTP" with "NRTP," in Table 3.3.1-1 footnotes (a) and (b), SR 3.3.1.7 Note 2, and Table 3.3.2-1 footnotes (c) and (d). A definition would be added for NRTP (nuclear rated thermal power) in Section 1.1 as the indicated neutron flux at RTP. These editorial clarifications will reflect the fact that the logarithmic power level of 1E-4% is not a percentage of the "total reactor core heat transfer rate to the reactor coolant of 3876 MWt," as RTP is defined in Section 1.1, but is instead a percentage of the indicated neutron flux at RTP.

An editorial change is also proposed to specify NRTP as the "ALLOWABLE VALUE" parameter for the high logarithmic power level trip setpoint in Table 3.3.1-1 to correct the unintended omission of the trip setpoint parameter during preparation of the Improved Technical Specifications. This change will fill in the omitted parameter with the correct parameter of NRTP that is also consistent with the high logarithmic power trip setpoint parameter in Table 3.3.2-1.

These changes do not constitute a physical change to the unit or make changes in the RPS instrumentation setpoints, system logic or manual actuation. In addition, these changes do not alter physical plant equipment or the way in which plant equipment is operated. This change is editorial in that it corrects the TS wording to match the appropriate power parameter that was originally intended and required by safety analyses, and that has been implemented since original licensing of the PVNGS plants. Therefore, this change does not involve a significant reduction in a margin of safety.

Based upon the above considerations, the staff concludes that the amendment meets the three criteria of 10 CFR 50.92. Therefore, the staff has made a final determination that the proposed amendment does not involve a significant hazards consideration.

6.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Arizona State official was notified of the proposed issuance of the amendments for the PVNGS units. The State official had no comments.

7.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has made a final finding that the amendment involves no significant hazards consideration. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

8.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: M. Fields, PDIV-2/NRR

Date: October 19, 1998