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 RECIP. NAME      RECIPIENT AFFILIATION  
 MARTIN, J.B.      Region 5 (Post 820201)

SUBJECT: Requests a Temporary Waiver of Compliance from following  
 PVNGS Unit 2 TS Limiting Conditions for Operation: 3.5.2.-  
 Emergency Core Cooling Sys & 3.6.2.1-Containment Spray Sys.

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WILLIAM F. CONWAY  
EXECUTIVE VICE PRESIDENT  
NUCLEAR

161-04665-WFC/NLT  
March 15, 1992

Mr. John B. Martin  
Regional Administrator, Region V  
U. S. Nuclear Regulatory Commission  
1450 Maria Lane, Suite 210  
Walnut Creek, CA 94596-5368

Dear Mr. Martin:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)**  
**Unit 2**  
**Docket No. STN 50-529**  
**Request for Temporary Waiver of Compliance**  
**from Technical Specifications, Revision 2**  
**File: 92-056-026**

Arizona Public Service Company (APS) hereby requests a Temporary Waiver of Compliance from the following PVNGS Unit 2 Technical Specifications' Limiting Conditions for Operation (LCO): 3.5.2 - Emergency Core Cooling System (ECCS), 3.6.2.1 - Containment Spray System (CSS), 3.7.1.2 - Auxiliary Feedwater System (AFS), 3.7.3 - Essential Cooling Water System (ECWS), and 3.7.11 - Shutdown Cooling System (SDCS). The existing LCOs allow one train for each system to be inoperable for a maximum of 72 hours. An additional 21 hours is necessary to allow Unit 2 to complete diagnostic testing and corrective maintenance on the ECWS heat exchanger to repair tube leaks. The ECWS is a required support system for the determination of operability of the aforementioned systems. The Temporary Waiver of Compliance would allow Train A of each system to be inoperable for 21 hours beyond the currently allowed outage time.

The ECWS Train A also provides cooling for the Essential Chilled Water System Train A. LCO 3.7.6 currently allows one essential chilled water train to be inoperable for a maximum of 7 days. Hence, a Temporary Waiver of Compliance is not required for LCO 3.7.6. However, APS currently restricts operation with an inoperable train to no more than 72 hours as documented in Licensee Event Report 1-91-007-00. APS is currently preparing a Technical Specification amendment request to change the 7-day action requirement for operability to 72 hours for the Essential Chilled Water LCO 3.7.6, consistent with the operability requirements of the ECCS, CSS, and AFS LCOs.

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March 15, 1992

Mr. John B. Martin  
U. S. Nuclear Regulatory Commission  
Temporary Waiver of Compliance, Revision 2  
Page 2

A Temporary Waiver of Compliance is being requested to prevent an unnecessary plant shutdown to Mode 5 and to provide up to 21 hours beyond the currently allowed outage time to complete diagnostic testing and corrective maintenance on the ECWS Train A heat exchanger. However, should it become apparent that the work on the ECWS heat exchanger cannot be completed within the extended outage time, APS will immediately begin an orderly shutdown of PVNGS Unit 2. The Plant Review Board has reviewed the Request for Temporary Waiver of Compliance and determined that the extension does not constitute an unreviewed safety question or create a nuclear safety hazard.

APS began working on the ECWS at approximately 3:25 p.m. MST on March 12, 1992. Therefore, it is requested that the NRC review and approve the enclosed Temporary Waiver of Compliance prior to 3:25 p.m. MST on March 15, 1992, in order to allow work to extend beyond the currently allowed outage time.

Pursuant to 10 CFR 50.91(b)(1), a copy of this request is being forwarded to the Arizona Radiation Regulatory Agency.

If you have any questions, please contact Michael E. Powell at (602) 340-4981.

Sincerely,



WFC/MEP/NLT/pmm

Enclosure

cc: Document Control Desk  
C. M. Trammell  
D. H. Coe  
A. H. Gutterman  
W. A. Wright



**ENCLOSURE**

**ARIZONA PUBLIC SERVICE COMPANY REQUEST FOR  
TEMPORARY WAIVER OF COMPLIANCE, REVISION 2  
PALO VERDE NUCLEAR GENERATING STATION UNIT 2**

**LIMITING CONDITION FOR OPERATION**

- 3.5.2        EMERGENCY CORE COOLING SYSTEM**
- 3.6.2.1     CONTAINMENT SPRAY SYSTEM**
- 3.7.1.2     AUXILIARY FEEDWATER SYSTEM**
- 3.7.3        ESSENTIAL COOLING WATER SYSTEM**
- 3.7.11      SHUTDOWN COOLING SYSTEM**



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**REVISED REQUEST FOR TEMPORARY WAIVER OF COMPLIANCE  
LIMITING CONDITION FOR OPERATION  
3.5.2; 3.6.2.1, 3.7.1.2; 3.7.3, AND 3.7.11**

**REQUIREMENTS FOR WHICH THE WAIVER IS REQUESTED**

Limiting Condition for Operation 3.5.2; Emergency Core Cooling System

Limiting Condition for Operation (LCO) 3.5.2 specifies that at least 2 Emergency Core Cooling System (ECCS) subsystems shall be operable while in Modes 1, 2, and 3. With one ECCS subsystem inoperable; action is required to restore at least two subsystems to operable status within 72 hours or be in at least hot standby within the next 6 hours and in hot shutdown within the following 6 hours.

The operability of two separate and independent ECCS subsystems with the reactor coolant system (RCS) temperature greater than or equal to 350 °F ensures that sufficient emergency core cooling capability will be available in the event of a loss of coolant accident assuming loss of one subsystem through any single failure consideration. Either subsystem operating in conjunction with the safety injection tanks is capable of supplying sufficient core cooling. In addition, each ECCS subsystem provides long-term core cooling capability in the recirculation mode during the accident recovery period.

Arizona Public Service Company (APS) requests a Temporary Waiver of Compliance to the requirement for the restoration of ECCS Train A subsystems within 72 hours. APS proposes to extend this requirement 21 hours beyond the currently allowed outage time. A Temporary Waiver of Compliance from LCO 3.5.2 action is required because support systems will be inoperable as a result of the workscope defined in this submittal.

Limiting Condition for Operation 3.6.2.1; Containment Spray System

LCO 3.6.2.1 specifies that at least two independent Containment Spray Systems (CSS) shall be operable during Modes 1, 2, 3, and 4. With one CSS inoperable, action is required to restore the inoperable spray system to operable status within 72 hours or be in at least hot standby within the next 6 hours; restore the inoperable spray system to operable status within the next 48 hours or be in cold shutdown within the following 30 hours.

The operability of the CSS ensures that containment depressurization and cooling capability will be available in the event of a loss of coolant accident. The CSS and the containment cooling system are redundant to each other in providing post-accident cooling of the containment atmosphere. The CSS also provides a mechanism for removing iodine from the containment atmosphere.



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APS requests a Temporary Waiver of Compliance to the requirement for the restoration of the CSS Train A within 72 hours. APS proposes to extend this requirement 21 hours beyond the currently allowed outage time. A Temporary Waiver of Compliance is required from LCO 3.6.2.1 because support systems will be inoperable as a result of the workscope defined in this submittal.

#### Limiting Condition for Operation 3.7.1.2: Auxiliary Feedwater System

LCO 3.7.1.2 specifies that at least three independent steam generator auxiliary feedwater pumps in the Auxiliary Feedwater System (AFS) and associated flow paths shall be operable during Modes 1, 2, 3, and 4. With one AFS pump inoperable, action is required to restore the required auxiliary feedwater pumps to operable status within 72 hours or be in at least hot standby within the next 6 hours and in hot shutdown within the following 6 hours.

The operability of the AFS ensures that the RCS can be cooled down to less than 350 °F from normal operating conditions in the event of a total loss of offsite power.

APS requests a Temporary Waiver of Compliance to the requirement for the restoration of the AFS Train A Pump within 72 hours. APS proposes to extend this requirement 21 hours beyond the currently allowed outage time. A Temporary Waiver of Compliance is required from LCO 3.7.1.2 because support systems will be inoperable as a result of the workscope defined in this submittal.

#### Limiting Condition for Operation 3.7.3: Essential Cooling Water System

LCO 3.7.3 specifies that at least two independent Essential Cooling Water System (ECWS) loops shall be operable while in Modes 1, 2, 3, and 4. With only one essential cooling water loop operable, action is required to restore at least two loops to operable status within 72 hours or be in at least hot standby within the next 6 hours and in cold shutdown within the following 30 hours.

The operability of the ECWS ensures that sufficient cooling capacity is available for continued operation of safety-related equipment during normal and accident conditions. The design of the system includes two separate, independent, redundant, closed loop, safety-related trains. Either train of the ECWS is capable for supporting 100% of the cooling functions required for a safe reactor shutdown or following a loss of coolant accident. The ECWS operates at a lower pressure than the Essential Spray Pond System (ESPS) as protection against leakage into the ESPS from the ECWS in case of tube leakage in the ECWS heat exchanger.



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APS requests a Temporary Waiver of Compliance to the requirement for the restoration of the ECWS Train A within 72 hours. APS proposes to extend this requirement 21 hours beyond the currently allowed outage time. A Temporary Waiver of Compliance is required to allow for work to be completed on the ECWS Train A heat exchanger.

#### Limiting Condition for Operation 3.7.11: Shutdown Cooling System

LCO 3.7.11 specifies that at least two independent Shutdown Cooling Systems (SDCS) shall be operable, with one operable low pressure safety injection pump, and an independent operable flow path capable of taking suction from the RCS hot leg and discharging coolant through the shutdown cooling heat exchanger and back to the RCS through the cold leg injection lines during Modes 1, 2, and 3. With one SDCS inoperable, action is required to restore the inoperable subsystem to operable status within 72 hours or be in at least hot standby within 1 hour and be in at least hot shutdown within the next 6 hours and in cold shutdown within the following 30 hours.

The operability of two separate and independent shutdown cooling subsystems ensures that the capability of initiating shutdown cooling in the event of an accident exists even assuming the most limiting single failure. The shutdown cooling system is one means of providing long-term post-accident reactor cooling. One shutdown cooling subsystem, capable of supporting the entire heat load, would be initiated during the accident recovery period with the RCS temperature less than 350 °F.

APS requests a Temporary Waiver of Compliance to the requirement for the restoration of the SDCS Train A within 72 hours. APS proposes to extend this requirement for 21 hours beyond the currently allowed outage time. A Temporary Waiver of Compliance from LCO 3.7.11 is required since the ECWS is a support system for the SDCS heat exchanger.

#### **NEED FOR PROMPT ACTION**

On March 4, 1992, the ECWS chloride and sulfate ions were at maximum concentrations of 6.6 and 18.3 parts per million (ppm), respectively. These concentrations exceed the closed cooling water chemistry procedure acceptance criteria of less than or equal to 5 ppm. Attempts to restore the out-of-specification parameters utilizing feed and bleed were unsuccessful. Unit 2 Chemistry was informed that the ECWS expansion tank level had increased when running the pumps on the Essential Spray Pond System (ESPS) without the ECWS pumps running.

Though the heat exchanger water quality was well within Updated Final Safety Analysis Report Table 9.2-5 specifications, there was an increase in chlorides and sulfates. These anions were believed to have been introduced into the ECWS from the ESPS due to heat exchanger tube leaks. The heat exchanger is of the shell and tube type. The tube side is furnished with cooling water from the ESPS. The shell side carries the ECWS



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cooling water. This closed-loop, shell-side water is initially supplied with demineralized water from the demineralized water system. The effect of sulfates and chlorides on system corrosion will increase as contaminant levels increase, although the ECWS is normally at ambient temperature which will minimize the potential corrosive effects.

Based on the closed cooling water chemistry analysis and expansion tank level increases, APS suspected that the ECWS Train A heat exchanger had tube leaks. This was confirmed on March 13, 1992. A Temporary Waiver of Compliance is being requested to prevent an unnecessary plant shutdown to Mode 5 and to provide up to 21 hours beyond the currently allowed outage time to complete diagnostic testing and corrective maintenance on the ECWS Train A heat exchanger.

### COMPENSATORY MEASURES

Unit 2 Operations will maintain operability of the Train A ESPS and Emergency Diesel Generator (EDG) while in these LCO actions. Train B safe-shutdown components and the Non-essential Auxiliary Feedwater Pump will be verified and maintained fully operable, and no non-emergent work will be performed on these components while in these LCO action statements. These components will be verified and maintained operable, and work will be controlled in accordance with PVNGS Technical Specifications, administrative controls, and temporary instructions which have been provided.

APS has entered Technical Specification LCO 3.7.6, ACTIONS a and b for the Essential Chilled Water System Train A. LCO ACTION b requires verification that the Normal Heating, Ventilation, and Air-conditioning System (HVAC) is providing space cooling to the vital power distribution rooms that depend on the inoperable Essential Chilled Water System for space cooling. Upon positive verification of the Normal HVAC cooling, no further cascading of the Unit 2 Technical Specifications is required (i.e., the 2-hour LCO 3.8.2.1 for loss of direct current sources is not applicable with the verification of the Normal HVAC).

Switchyard (525 kilovolt and startup yards) activities are normally performed under the cognizance and direction of the Unit 1 Shift Supervisor. Temporary instructions have been provided to Unit 1 to ensure that no interruption of offsite power to Unit 2 occurs while in these LCO action statements. APS and Salt River Project (SRP) responsible control centers have been notified of the work being performed in Unit 2 and will take precautions for the outside distribution system. All activity in the switchyard has been suspended except for work on the Unit 1 main generator breakers; however, this work is electrically isolated from the switchyard. No other work will be performed or vehicular access allowed in the switchyard without specific review and approval by the Unit 1 Shift Supervisor and the Vice President, Nuclear Production. Any emergent work in the switchyard will be evaluated for potential affect on the supply of offsite power to Unit 2 and will be authorized by the Vice President, Nuclear Production.

## JUSTIFICATION FOR AND DURATION OF THE REQUEST

The extension of the LCO for 21 hours beyond the allowed outage time, for one inoperable train of the ECWS and supported systems, will provide the opportunity to complete diagnostic testing and corrective maintenance on Unit 2 ECWS Train A heat exchanger. Failure to grant relief for the additional 21 hours may result in an unnecessary plant shutdown and a consequent plant transient.

Work on the ECWS Train A heat exchanger required entering the 72-hour action statements. Work entails clearing the system for work, draining the system, visual inspection, eddy current inspection, tube plugging, testing, and system restoration. Visual inspection has been performed using a boroscope. Eddy current testing is being performed on suspect tubes, as required. Results of the eddy current examination will be evaluated and the determination of additional eddy current examinations will be determined. The ECWS will not be returned to service in the time required by LCO 3.7.3. Work required to be completed prior to declaring the system operable as of 9:00 a.m. MST on March 15, 1992, includes plugging 71 tubes which had potential indication when eddy current tested (10 hours), installation of heads and closure of the ECWS heat exchanger (9 hours), system fill and vent (4 hours), performance of the surveillance test to declare the system operable (4 hours), and final administrative verifications (1 hour). Consequently, the request for a Temporary Waiver of Compliance from LCO 3.5.2, 3.6.2.1, 3.7.1.2, 3.7.3 and 3.7.11 to allow Train A systems to be inoperable for 21 hours beyond the allowed outage time, has been evaluated and it has been determined that this request will not impact public health and safety.

A Probabilistic Risk Analysis was performed to determine the impact on plant risk associated with a one-time extension of the LCOs for 21 hours beyond the allowed outage time. The analysis assumed that all Train B components and the Non-essential Auxiliary Feedwater Pump remain operable through the duration of the action statement, and the ESPS Train A cooling to the Train A EDG would be available through the duration of the action statement. The nominal core damage probability for a 72 hour period of normal operation is  $7.4E-7$  (based on a core damage frequency of  $9E-5/\text{year}$ ). The core damage probability increases by  $2.5E-6$  for the 72-hour period currently allowed by Technical Specifications when an ECWS heat exchanger is out of service. The additional 21 hours allowed by the Temporary Waiver of Compliance would result in another increase in core damage probability of  $7.3E-7$ , resulting in a total increase in core damage probability of  $3.2E-6$  for the 93-hour period. The increase of  $7.3E-7$  in core damage probability associated with taking an ECWS Train out of service an additional 21 hours is considered acceptable as it is less than the core damage probability associated with a plant shutdown of  $2.9E-6$ .



## **EVALUATION OF THE SAFETY SIGNIFICANCE AND BASIS FOR NO SIGNIFICANT HAZARDS CONSIDERATION**

The required corrective action can be performed successfully at power on Train A. During normal plant operation, the ECWS, ECCS, CSS, AFS, SDCS, and Essential Chilled Water System are not operating. The redundant features of these systems allow testing of one train without violation of Technical Specifications. When the action statement for LCO 3.7.3 is entered, the action statements for the aforementioned systems must be entered since these systems can perform their functions only if all necessary support systems are capable of performing their related support functions. When a support system is determined to be inoperable, all systems for which that support system is required for system operability are declared inoperable and the LCOs for those systems are entered.

Normal HVAC supplies space cooling to Train A and B systems and components while the plant is operating. Essential cooling is used to maintain space temperatures within limits when shutdown cooling is operating and reactor coolant system temperatures are above approximately 100 °F or when the Train A auxiliary feedwater pump is operating. Based upon current seasonal conditions at PVNGS and compensatory measures which could be taken to restore room cooling, if a non-Loss of Coolant Accident event were to occur, the unavailability of essential cooling water and essential chilled water is not expected to result in the failure of Train A components necessary for safely shutting down the plant (e.g., Train A auxiliary feedwater pump, Train A vital power). Train A low pressure safety injection and containment spray pumps would exceed safe operational temperature requirements after approximately six hours.

If an event were to occur requiring operation of shutdown cooling, an additional success path is available if the Train B Low Pressure Safety Injection (LPSI) and Containment Spray (CS) pumps become unavailable. The Train A SDC pumps (CS or LPSI) can be cross-connected to the Train B SDC system to use the operable Train B SDCS heat exchanger. This success path is described in PVNGS procedure 42AO-2ZZ22, "Loss of Shutdown Cooling." Flow through the cross-connect is adequate to remove decay heat loads existing when it would become necessary to continue the cooldown in SDC. If neither train of ECWS is available for performing SDC functions, the Nuclear Cooling Water System (NCWS) is available and can be cross-tied to the desired ECWS train to provide a heat sink for SDC. Procedures for cross-tying NC and ECW are contained in PVNGS procedure 42RO-2ZZ10, "Functional Recovery Procedure." Additionally, the ECW trains can be cross-tied through the common NC connection. This is not described in procedures; however, it involves a relatively simple valve alignment which can be accomplished under the direction of qualified, licensed personnel.

The Temporary Waiver of Compliance only impacts the time allowed for Train A to be inoperable and does not change the equipment which is allowed to be inoperable. Therefore, the consequences of a previously evaluated accident remain unchanged.



Increasing the allowed out-of-service time of the aforementioned LCOs for an additional 21 hours on a one-time only basis for the purpose of completing diagnostic testing and corrective maintenance is the safest course of action other than placing the unit in cold shutdown. The safety function of Train A can be performed by the 100% redundant Train B. The possibility of a new or different kind of accident from any accident previously evaluated will not be created by the increase in time allowed for an inoperable train.

Extension of the 21-hour limit would not involve a significant reduction in the margin of safety because there are no new or common failure modes being created by the extension. The performance of the associated safety systems will not be degraded by the extended out-of-service time.

### **ENVIRONMENTAL IMPACT CONSIDERATION DETERMINATION**

The proposed Temporary Waiver of Compliance request does not involve an unreviewed environmental question because operation of PVNGS Unit 2 with the LCO extensions would not:

- A. Result in a significant increase in any adverse environmental impact previously evaluated in the Final Environmental Statement as modified by the Staff's testimony to the Atomic Safety and Licensing Board; or
- B. Result in a significant change in effluent or power levels; or
- C. Result in matters not previously reviewed in the licensing basis for PVNGS which may have a significant environmental impact.

As discussed above, no significant reduction in the margin of safety and no new accidents are introduced by this Temporary Waiver of Compliance. This Temporary Waiver of Compliance does not significantly affect effluent or power levels, and has no environmental impact.

