October 7, 1986

Docket Nos.: 50-528
and 50-529

Mr. E. E. Van Brunt, Jr.
Executive Vice President
Arizona Nuclear Power Project
Post Office Box 52034
Phoenix, Arizona 85072-2034

Dear Mr. Van Brunt:

Subject: Issuance of Amendment No. 10 to Facility Operating License NPF-41 and Amendment No. 5 to Facility Operating License No. NPF-51 for Palo Verde, Units 1 and 2

The Commission has issued the enclosed Amendment No. 10 to Facility Operating License No. NPF-41 and Amendment No. 5 to Facility Operating License No. NPF-51 for the Palo Verde Nuclear Generating Station, Units 1 and 2. The amendments consist of changes to the Technical Specifications in response to your application transmitted by letter dated July 23, 1986, as supplemented by letters dated August 26 and September 26, 1986.

The amendments revised Tables 2.2-1 and 3.3-2 of the Technical Specifications of each license to change the setpoints involved with the Low Reactor Coolant Flow reactor trip function. The changed values are still within the bounds of the safety analyses and were revised to accommodate process noise without tripping the reactors.

A copy of the Safety Evaluation supporting the amendments is also enclosed.

Sincerely,

ISI

E. A. Licitra, Project Manager
PWR Project Directorate No. 7
Division of PWR Licensing-B

Enclosures:
1. Amendment No. 10 to NPF-41
2. Amendment No. 5 to NPF-51
3. Safety Evaluation

cc: See next page

PD7	PD7	OGC-Bell	PB:AD	DIR:PD7
EALicitra/yt	JLee		DCrutchfield	GWKnighton
9/25/86	9/29/86	10/1/86	10/1/86	10/7/86

Mr. E. E. Van Brunt, Jr.
Arizona Nuclear Power Project

Palo Verde

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Phoenix, Arizona 85003

October 7, 1986

ISSUANCE OF AMENDMENT NO. 10 TO FACILITY OPERATING
LICENSE NPF-41 AND AMENDMENT NO. 5 TO FACILITY OPERATING
LICENSE NPF-51 FOR PALO VERDE, UNITS 1 AND 2

DISTRIBUTION
Docket File 50-528/529
NRC PDR
Local PDR
PD7 Reading
FMiraglia
JLee (5)
EALicitra
Attorney, OGC - Bethesda
LHarmon
EJordan
BGrimes
JPartlow
TBarnhart (8)
WJones
WRegan
ACRS (10)
OPA
RDiggs, LFMB
EButcher
NThompson
GWKnighton
ETomlinson
CLiang
CThomas
LMarsh

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

ARIZONA PUBLIC SERVICE COMPANY, ET AL.

DOCKET NO. STN 50-528

PALO VERDE NUCLEAR GENERATING STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 10
License No. NPF-41

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment, dated July 23, 1986, as supplemented by letters dated August 26 and September 26, 1986, by the Arizona Public Service Company (APS) on behalf of itself and the Salt River Project Agricultural Improvement and Power District, El Paso Electric Company, Southern California Edison Company, Public Service Company of New Mexico, Los Angeles Department of Water and Power, and Southern California Public Power Authority (licensees), complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of Act, and the regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public;

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the enclosure to this license amendment, and paragraph 2.C(2) of the Facility Operating License No. NPF-41 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 10, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in this license. APS shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

E. A. Licitra, Project Manager
PWR Project Directorate No. 7
Division of PWR Licensing-B

Enclosure:
Change to the Technical
Specifications

Date of Issuance: October 7, 1986

ENCLOSURE TO LICENSE AMENDMENT NO. 10

FACILITY OPERATING LICENSE NO. NPF-41

DOCKET NO. STN 50-528

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised pages are identified by Amendment number and contain vertical lines indicating the areas of change. Also to be replaced are the following overleaf pages to the amended pages.

Amendment Pages	Overleaf Pages
2-3	2-4
2-6	2-5
3/4 3-11	3/4 3-12

TABLE 2.2-1

REACTOR PROTECTIVE INSTRUMENTATION TRIP SETPOINT LIMITS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
I. TRIP GENERATION		
A. Process		
1. Pressurizer Pressure - High	$\leq$ 2383 psia	$\leq$ 2388 psia
2. Pressurizer Pressure - Low	$\geq$ 1837 psia (2)	$\geq$ 1822 psia (2)
3. Steam Generator Level - Low	$\geq$ 44.2% (4)	$\geq$ 43.7% (4)
4. Steam Generator Level - High	$\leq$ 91.0% (9)	$\leq$ 91.5% (9)
5. Steam Generator Pressure - Low	$\geq$ 919 psia (3)	$\geq$ 912 psia (3)
6. Containment Pressure - High	$\leq$ 3.0 psig	$\leq$ 3.2 psig
7. Reactor Coolant Flow - Low		
a. Rate	$\leq$ 0.115 psi/sec (6)(7)	$\leq$ 0.118 psi/sec (6)(7)
b. Floor	$\geq$ 11.9 psid (6)(7)	$\geq$ 11.7 psid(6)(7)
c. Band	$\leq$ 10.0 psid (6)(7)	$\leq$ 10.2 psid (6)(7)
8. Local Power Density - High	$\leq$ 21.0 kW/ft (5)	$\leq$ 21.0 kW/ft (5)
9. DNBR - Low	$\geq$ 1.231 (5)	$\geq$ 1.231 (5)
B. Excore Neutron Flux		
1. Variable Overpower Trip		
a. Rate	$<$ 10.6%/min of RATED THERMAL POWER (8)	$<$ 11.0%/min of RATED THERMAL POWER (8)
b. Ceiling	$<$ 110.0% of RATED THERMAL POWER (8)	$<$ 111.0% of RATED THERMAL POWER (8)
c. Band	$<$ 9.8% of RATED THERMAL POWER (8)	$<$ 10.0% of RATED THERMAL POWER (8)

TABLE 2.2-1 (Continued)

REACTOR PROTECTIVE INSTRUMENTATION TRIP SETPOINT LIMITS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
2. Logarithmic Power Level - High (1)		
a. Startup and Operating	< 0.798% of RATED THERMAL POWER	< 0.895% of RATED THERMAL POWER
b. Shutdown	< 0.798% of RATED THERMAL POWER	< 0.895% of RATED THERMAL POWER
C. Core Protection Calculator System		
1. CEA Calculators	Not Applicable	Not Applicable
2. Core Protection Calculators	Not Applicable	Not Applicable
D. Supplementary Protection System		
Pressurizer Pressure - High	≤ 2409 psia	≤ 2414 psia
II. RPS LOGIC		
A. Matrix Logic	Not Applicable	Not Applicable
B. Initiation Logic	Not Applicable	Not Applicable
III. RPS ACTUATION DEVICES		
A. Reactor Trip Breakers	Not Applicable	Not Applicable
B. Manual Trip	Not Applicable	Not Applicable

TABLE 2.2-1 (Continued)

REACTOR PROTECTIVE INSTRUMENTATION TRIP SETPOINT LIMITS

TABLE NOTATIONS

(1) Trip may be manually bypassed above 10^{-4}% of RATED THERMAL POWER; bypass shall be automatically removed when THERMAL POWER is less than or equal to 10^{-4}% of RATED THERMAL POWER.

(2) In MODES 3-6, value may be decreased manually, to a minimum of 100 psia, as pressurizer pressure is reduced, provided the margin between the pressurizer pressure and this value is maintained at less than or equal to 400 psi; the setpoint shall be increased automatically as pressurizer pressure is increased until the trip setpoint is reached. Trip may be manually bypassed below 400 psia; bypass shall be automatically removed whenever pressurizer pressure is greater than or equal to 500 psia.

(3) In MODES 3-6, value may be decreased manually as steam generator pressure is reduced, provided the margin between the steam generator pressure and this value is maintained at less than or equal to 200 psi; the setpoint shall be increased automatically as steam generator pressure is increased until the trip setpoint is reached.

(4) % of the distance between steam generator upper and lower level wide range instrument nozzles.

(5) As stored within the Core Protection Calculator (CPC). Calculation of the trip setpoint includes measurement, calculational and processor uncertainties, and dynamic allowances. Trip may be manually bypassed below 1% of RATED THERMAL POWER; bypass shall be automatically removed when THERMAL POWER is greater than or equal to 1% of RATED THERMAL POWER.

The approved DNBR limit is 1.231 which includes a partial rod bow penalty compensation. If the fuel burnup exceeds that for which an increased rod bow penalty is required, the DNBR limit shall be adjusted. In this case a DNBR trip setpoint of 1.231 is allowed provided that the difference is compensated by an increase in the CPC addressable constant BERR1 as follows:

$$BERR1_{new} = BERR1_{old} \left[1 + \frac{RB - RB_o}{100} \times \frac{d\ (\%\ POL)}{d\ (\%\ DNBR)}\right]$$

where $BERR1_{old}$ is the uncompensated value of BERR1; RB is the fuel rod bow penalty in % DNBR; RB_o is the fuel rod bow penalty in % DNBR already accounted for in the DNBR limit; POL is the power operating limit; and d (% POL)/d (% DNBR) is the absolute value of the most adverse derivative of POL with respect to DNBR.

TABLE 2.2-1 (Continued)

REACTOR PROTECTIVE INSTRUMENTATION TRIP SETPOINT LIMITS

TABLE NOTATIONS (Continued)

(6) RATE is the maximum rate of decrease of the trip setpoint. There are no restrictions on the rate at which the setpoint can increase.
FLOOR is the minimum value of the trip setpoint.
BAND is the amount by which the trip setpoint is below the input signal unless limited by Rate or Floor.
Setpoints are based on steam generator differential pressure.

(7) The setpoint may be altered to disable trip function during testing pursuant to Specification 3.10.3.

(8) RATE is the maximum rate of increase of the trip setpoint. There are no restrictions on the rate at which the setpoint can decrease.
CEILING is the maximum value of the trip setpoint.
BAND is the amount by which the trip setpoint is above the input signal unless limited by the rate or the ceiling.

(9) % of the distance between steam generator upper and lower level narrow range instrument nozzles.

TABLE 3.3-2

REACTOR PROTECTIVE INSTRUMENTATION RESPONSE TIMES

FUNCTIONAL UNIT	RESPONSE TIME
I. TRIP GENERATION	
A. Process	
1. Pressurizer Pressure - High	≤1.15 seconds
2. Pressurizer Pressure - Low	≤1.15 seconds
3. Steam Generator Level - Low	≤1.15 seconds
4. Steam Generator Level - High	≤1.15 seconds
5. Steam Generator Pressure - Low	≤ 1.15 seconds
6. Containment Pressure - High	≤ 1.15 seconds
7. Reactor Coolant Flow - Low	≤ 0.58 second
8. Local Power Density - High	
a. Neutron Flux Power from Excore Neutron Detectors	≤0.75 second*
b. CEA Positions	≤1.35 second**
c. CEA Positions: CEAC Penalty Factor	0.75 second**
9. DNBR - Low	
a. Neutron Flux Power from Excore Neutron Detectors	≤0.75 second*
b. CEA Positions	≤1.35 second**
c. Cold Leg Temperature	≤0.75 second##
d. Hot Leg Temperature	≤0.75 second##
e. Primary Coolant Pump Shaft Speed	≤0.75 second#
f. Reactor Coolant Pressure from Pressurizer	≤0.75 second###
g. CEA Positions: CEAC Penalty Factor	0.75 second**
B. Excore Neutron Flux	
1. Variable Overpower Trip	≤ 0.55 second*
2. Logarithmic Power Level - High	
a. Startup and Operating	≤ 0.55 second*
b. Shutdown	≤ 0.55 second*

TABLE 3.3-2 (Continued)

REACTOR PROTECTIVE INSTRUMENTATION RESPONSE TIMES

FUNCTIONAL UNIT	RESPONSE TIME
C. Core Protection Calculator System	
1. CEA Calculators	Not Applicable
2. Core Protection Calculators	Not Applicable
D. Supplementary Protection System	
Pressurizer Pressure - High	$\leq$ 1.15 second
II. RPS LOGIC	
A. Matrix Logic	Not Applicable
B. Initiation Logic	Not Applicable
III. RPS ACTUATION DEVICES	
A. Reactor Trip Breakers	Not Applicable
B. Manual Trip	Not Applicable

*Neutron detectors are exempt from response time testing. The response time of the neutron flux signal portion of the channel shall be measured from the detector output or from the input of first electronic component in channel.

**Response time shall be measured from the output of the sensor. Acceptable CEA sensor response shall be demonstrated by compliance with Specification 3.1.3.4.

#The pulse transmitters measuring pump speed are exempt from response time testing. The response time shall be measured from the pulse shaper input.

##Response time shall be measured from the output of the resistance temperature detector (sensor). RTD response time shall be measured at least once per 18 months. The measured response time of the slowest RTD shall be less than or equal to 13 seconds. Adjustments to the CPC addressable constants given in Table 3.3-2a shall be made to accomodate current values of the RTD time constants. If the RTD time constant for a CPC channel exceeds the value corresponding to the penalties currently in use, the affected channel(s) shall be declared inoperable until penalties appropriate to the new time constant are installed.

###Response time shall be measured from the output of the pressure transmitter. The transmitter response time shall be less than or equal to 0.7 second.

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

ARIZONA PUBLIC SERVICE COMPANY, ET AL.

DOCKET NO. STN 50-529

PALO VERDE NUCLEAR GENERATING STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 5
License No. NPF-51

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment, dated July 23, 1986, as supplemented by letters dated August 26 and September 26, 1986, by the Arizona Public Service Company (APS) on behalf of itself and the Salt River Project Agricultural Improvement and Power District, El Paso Electric Company, Southern California Edison Company, Public Service Company of New Mexico, Los Angeles Department of Water and Power, and Southern California Public Power Authority (licensees), complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of Act, and the regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public;

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the enclosure to this license amendment, and paragraph 2.C(2) of the Facility Operating License No. NPF-51 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 5, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in this license. APS shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

E. A. Licitra, Project Manager
PWR Project Directorate No. 7
Division of PWR Licensing-B

Enclosure:
Change to the Technical
Specifications

Date of Issuance: October 7, 1986

ENCLOSURE TO LICENSE AMENDMENT NO. 5

FACILITY OPERATING LICENSE NO. NPF-51

DOCKET NO. STN 50-529

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised pages are identified by Amendment number and contain vertical lines indicating the areas of change. Also to be replaced are the following overleaf pages to the amended pages.

Amendment Pages	Overleaf Pages
2-3	2-4
2-6	2-5
3/4 3-11	3/4 3-12

TABLE 2.2-1

REACTOR PROTECTIVE INSTRUMENTATION TRIP SETPOINT LIMITS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
I. TRIP GENERATION		
A. Process		
1. Pressurizer Pressure - High	≤ 2383 psia	≤ 2388 psia
2. Pressurizer Pressure - Low	≥ 1837 psia (2)	≥ 1822 psia (2)
3. Steam Generator Level - Low	≥ 44.2% (4)	≥ 43.7% (4)
4. Steam Generator Level - High	≤ 91.0% (9)	≤ 91.5% (9)
5. Steam Generator Pressure - Low	≥ 919 psia (3)	≥ 912 psia (3)
6. Containment Pressure - High	≤ 3.0 psig	≤ 3.2 psig
7. Reactor Coolant Flow - Low		
a. Rate	≤ 0.115 psi/sec (6)(7)	≤ 0.118 psi/sec (6)(7)
b. Floor	≥ 11.9 psid (6)(7)	≥ 11.7 psid(6)(7)
c. Band	≤ 10.0 psid (6)(7)	≤ 10.2 psid (6)(7)
8. Local Power Density - High	≤ 21.0 kW/ft (5)	≤ 21.0 kW/ft (5)
9. DNBR - Low	≥ 1.231 (5)	≥ 1.231 (5)
B. Excore Neutron Flux		
1. Variable Overpower Trip		
a. Rate	< 10.6%/min of RATED THERMAL POWER (8)	< 11.0%/min of RATED THERMAL POWER (8)
b. Ceiling	< 110.0% of RATED THERMAL POWER (8)	< 111.0% of RATED THERMAL POWER (8)
c. Band	< 9.8% of RATED THERMAL POWER (8)	< 10.0% of RATED THERMAL POWER (8)

TABLE 2.2-1 (Continued)

REACTOR PROTECTIVE INSTRUMENTATION TRIP SETPOINT LIMITS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUES
2. Logarithmic Power Level - High (1)		
a. Startup and Operating	< 0.798% of RATED THERMAL POWER	< 0.895% of RATED THERMAL POWER
b. Shutdown	< 0.798% of RATED THERMAL POWER	< 0.895% of RATED THERMAL POWER
C. Core Protection Calculator System		
1. CEA Calculators	Not Applicable	Not Applicable
2. Core Protection Calculators	Not Applicable	Not Applicable
D. Supplementary Protection System		
Pressurizer Pressure - High	≤ 2409 psia	≤ 2414 psia
II. RPS LOGIC		
A. Matrix Logic	Not Applicable	Not Applicable
B. Initiation Logic	Not Applicable	Not Applicable
III. RPS ACTUATION DEVICES		
A. Reactor Trip Breakers	Not Applicable	Not Applicable
B. Manual Trip	Not Applicable	Not Applicable

TABLE 2.2-1 (Continued)

REACTOR PROTECTIVE INSTRUMENTATION TRIP SETPOINT LIMITS

TABLE NOTATIONS

(1) Trip may be manually bypassed above 10^{-4}% of RATED THERMAL POWER; bypass shall be automatically removed when THERMAL POWER is less than or equal to 10^{-4}% of RATED THERMAL POWER.

(2) In MODES 3-4, value may be decreased manually, to a minimum of 100 psia, as pressurizer pressure is reduced, provided the margin between the pressurizer pressure and this value is maintained at less than or equal to 400 psi; the setpoint shall be increased automatically as pressurizer pressure is increased until the trip setpoint is reached. Trip may be manually bypassed below 400 psia; bypass shall be automatically removed whenever pressurizer pressure is greater than or equal to 500 psia.

(3) In MODES 3-4, value may be decreased manually as steam generator pressure is reduced, provided the margin between the steam generator pressure and this value is maintained at less than or equal to 200 psi; the setpoint shall be increased automatically as steam generator pressure is increased until the trip setpoint is reached.

(4) % of the distance between steam generator upper and lower level wide range instrument nozzles.

(5) As stored within the Core Protection Calculator (CPC). Calculation of the trip setpoint includes measurement, calculational and processor uncertainties, and dynamic allowances. Trip may be manually bypassed below 1% of RATED THERMAL POWER; bypass shall be automatically removed when THERMAL POWER is greater than or equal to 1% of RATED THERMAL POWER.

The approved DNBR limit is 1.231 which includes a partial rod bow penalty compensation. If the fuel burnup exceeds that for which an increased rod bow penalty is required, the DNBR limit shall be adjusted. In this case a DNBR trip setpoint of 1.231 is allowed provided that the difference is compensated by an increase in the CPC addressable constant BERR1 as follows:

$$BERR1_{new} = BERR1_{old} \left[1 + \frac{RB - RB_o}{100} \times \frac{d\ (\%\ POL)}{d\ (\%\ DNBR)}\right]$$

where $BERR1_{old}$ is the uncompensated value of BERR1; RB is the fuel rod bow penalty in % DNBR; RB_o is the fuel rod bow penalty in % DNBR already accounted for in the DNBR limit; POL is the power operating limit; and d (% POL)/d (% DNBR) is the absolute value of the most adverse derivative of POL with respect to DNBR.

TABLE 2.2-1 (Continued)

REACTOR PROTECTIVE INSTRUMENTATION TRIP SETPOINT LIMITS

TABLE NOTATIONS (Continued)

(6) RATE is the maximum rate of decrease of the trip setpoint. There are no restrictions on the rate at which the setpoint can increase.
FLOOR is the minimum value of the trip setpoint.
BAND is the amount by which the trip setpoint is below the input signal unless limited by Rate or Floor.
Setpoints are based on steam generator differential pressure.

(7) The setpoint may be altered to disable trip function during testing pursuant to Specification 3.10.3.

(8) RATE is the maximum rate of increase of the trip setpoint. There are no restrictions on the rate at which the setpoint can decrease.
CEILING is the maximum value of the trip setpoint.
BAND is the amount by which the trip setpoint is above the input signal unless limited by the rate or the ceiling.

(9) % of the distance between steam generator upper and lower level narrow range instrument nozzles.

TABLE 3.3-2

REACTOR PROTECTIVE INSTRUMENTATION RESPONSE TIMES

FUNCTIONAL UNIT	RESPONSE TIME
I. TRIP GENERATION	
A. Process	
1. Pressurizer Pressure - High	$\leq$ 1.15 seconds
2. Pressurizer Pressure - Low	$\leq$ 1.15 seconds
3. Steam Generator Level - Low	$\leq$ 1.15 seconds
4. Steam Generator Level - High	$\leq$ 1.15 seconds
5. Steam Generator Pressure - Low	$\leq$ 1.15 seconds
6. Containment Pressure - High	$\leq$ 1.15 seconds
7. Reactor Coolant Flow - Low	$\leq$ 0.58 second
8. Local Power Density - High	
a. Neutron Flux Power from Excore Neutron Detectors	$\leq$ 0.75 second*
b. CEA Positions	$\leq$ 1.35 second**
c. CEA Positions: CEAC Penalty Factor	$\leq$ 0.75 second**
9. DNBR - Low	
a. Neutron Flux Power from Excore Neutron Detectors	$\leq$ 0.75 second*
b. CEA Positions	$\leq$ 1.35 second**
c. Cold Leg Temperature	$\leq$ 0.75 second##
d. Hot Leg Temperature	$\leq$ 0.75 second##
e. Primary Coolant Pump Shaft Speed	$\leq$ 0.75 second#
f. Reactor Coolant Pressure from Pressurizer	$\leq$ 0.75 second###
g. CEA Positions: CEAC Penalty Factor	$\leq$ 0.75 second**
B. Excore Neutron Flux	
1. Variable Overpower Trip	$\leq$ 0.55 second*
2. Logarithmic Power Level - High	
a. Startup and Operating	$\leq$ 0.55 second*
b. Shutdown	$\leq$ 0.55 second*

TABLE 3.3-2 (Continued)

REACTOR PROTECTIVE INSTRUMENTATION RESPONSE TIMES

FUNCTIONAL UNIT	RESPONSE TIME
C. Core Protection Calculator System	
1. CEA Calculators	Not Applicable
2. Core Protection Calculators	Not Applicable
D. Supplementary Protection System	
Pressurizer Pressure - High	$\leq$ 1.15 second
II. RPS LOGIC	
A. Matrix Logic	Not Applicable
B. Initiation Logic	Not Applicable
III. RPS ACTUATION DEVICES	
A. Reactor Trip Breakers	Not Applicable
B. Manual Trip	Not Applicable

*Neutron detectors are exempt from response time testing. The response time of the neutron flux signal portion of the channel shall be measured from the detector output or from the input of first electronic component in channel.

**Response time shall be measured from the output of the sensor. Acceptable CEA sensor response shall be demonstrated by compliance with Specification 3.1.3.4.

#The pulse transmitters measuring pump speed are exempt from response time testing. The response time shall be measured from the pulse shaper input.

##Response time shall be measured from the output of the resistance temperature detector (sensor). RTD response time shall be measured at least once per 18 months. The measured response time of the slowest RTD shall be less than or equal to 13 seconds. Adjustments to the CPC addressable constants given in Table 3.3-2a shall be made to accommodate current values of the RTD time constants. If the RTD time constant for a CPC channel exceeds the value corresponding to the penalties currently in use, the affected channel(s) shall be declared inoperable until penalties appropriate to the new time constant are installed.

###Response time shall be measured from the output of the pressure transmitter. The transmitter response time shall be less than or equal to 0.7 second.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 10 TO FACILITY OPERATING LICENSE NO. NPF-41

AND AMENDMENT NO. 5 TO FACILITY OPERATING LICENSE NO. NPF-51

ARIZONA PUBLIC SERVICE COMPANY, ET AL.

PALO VERDE NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2

DOCKET NOS. STN 50-528 AND STN 50-529

1.0 INTRODUCTION

By letter dated July 23, 1986, as supplemented by letters dated August 26 and September 26, 1986, the Arizona Public Service Company (APS) 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 (licensees), requested a change to the Technical Specifications for the Palo Verde Nuclear Generating Station, Units 1 and 2 (Appendices A to Facility Operating Licenses NPF-41 and NPF-51, respectively). The application requests that Tables 2.2-1 and 3.3-2 of the Technical Specifications for each unit be revised to change the setpoints involved with the Low Reactor Coolant Flow (LRCF) reactor trip function to values which are still bounded by current safety analyses so that process noise can be accommodated without tripping the reactors.

2.0 DISCUSSION

Table 2.2-1 of the Technical Specifications for Palo Verde, Units 1 and 2, includes trip setpoints for three parameters, i.e., RATE, FLOOR, and BAND (or STEP), which constitute the LRCF trip function. The response time for the LRCF trip function is included in Table 3.3-2 of the Technical Specifications.

The LRCF trip function provides primary protection for a Reactor Coolant Pump (RCP) sheared shaft event. In this event, the reduction in Reactor Coolant System (RCS) flow causes a reduction in the differential pressure across the primary side of the affected steam generator. The LRCF trip function uses a Rate Limited Variable Setpoint module to initiate a reactor trip based on a differential pressure input signal from the steam generator.

Under steady state conditions, the trip setpoint will stay below the differential pressure input signal by the trip function parameter BAND. During a transient, the trip setpoint will move away from the decreasing differential pressure input signal to try and maintain the separation defined by BAND. The rate of decrease of the trip setpoint is fixed by the trip function parameter RATE. If the rate of decrease of the differential pressure input signal is greater than RATE, a trip will occur when the differential pressure input signal eventually equals the trip setpoint. The minimum value that the trip setpoint can have is defined by the trip function parameter FLOOR.

The setpoint calculation uses a combination of the BAND, RATE, and FLOOR trip function parameters to provide the protection required. The trip function parameter FLOOR is used to provide protection for the sheared shaft event whenever the Steam Generator differential pressure is less than or equal to 22.5 psid. The trip BAND function parameters and RATE are used to provide protection for this event whenever the Steam Generator differential pressure is greater than 22.5 psid.

The LRCF trip function has four channels, and trip signals generated by any two of these channels will result in a reactor trip. The licensees state that because of process noise in the sensor impulse lines, the current settings for the LRCF trip function have caused Palo Verde, Units 1 and 2, to experience pre-trip alarms and channel trips. Actual reactor trips due to this trip function were experienced at Palo Verde, Unit 1 on July 12, 1986 and, again, on August 30, 1986.

As a result of the above problems, the licensees have requested the following changes to the setpoint limits shown on Table 2.2-1 for the LRCF trip function:

	Current Value	Proposed Value
RATE	$\leq$ 1.05%/sec (0.238 psi/sec)	$\leq$ 0.115 psi/sec
FLOOR	$\geq$ 52.2% (15.68 psid)	$\geq$ 11.9 psid
BAND	$\leq$ 40.0% (8.988 psid)	$\leq$ 10.0 psid

In addition, the licensees have requested that the response time shown on Table 3.3-2 for this function be changed from 0.65 seconds to 0.58 seconds.

In support of this request for amendments, the licensees provided information regarding the assumptions used in the analysis of record for the sheared shaft loss-of-flow event and the relationship of these assumptions to the measured values at the plant.

3.0 EVALUATION

The sequence of events for a postulated RCP sheared shaft accident at Palo Verde is based on a reactor trip occurring (reactor trip breakers open) 1.2 seconds after event initiation. For determining the previous setpoints for the

LRCF trip, the licensees had assumed a one-second process response time for LRCF, from the time the process reaches the trip setpoint to the time the reactor trip breakers open. Based on the calculated reactor coolant flow coastdown for a RCP sheared shaft event, the flow would decay to 90% of full flow in less than 0.2 seconds. Therefore, the setpoints for the LRCF trip had been based on the 90% flow value to ensure a reactor trip prior to 1.2 seconds.

The licensees' recent submittals indicated that the testing performed thus far has shown that the worst case process response time for the LRCF trip function has been approximately 0.35 seconds. In addition, the plant test procedure that is used to periodically verify this response time requires a response time of less than 0.5 seconds. Therefore, the licensees are proposing a response time of 0.58 seconds in the modified Technical Specifications Table 3.3-2, and they used this value to establish the new setpoints for the LRCF trip function. Based on a 0.58 seconds response time and using the same reactor coolant flow coastdown data previously used, the initiation of a trip signal at approximately 70 percent of full flow would still ensure, with sufficient conservatism, a reactor trip prior to 1.2 seconds into the postulated RCP sheared shaft accident.

The licensees' proposed value for the parameter FLOOR is lower than the present value. The proposed values for the parameters BAND and RATE are larger and smaller than present values, respectively.

The licensees derived the proposed value for the parameter FLOOR based on: (1) a response time of 0.58 seconds for the LRCF trip function, (2) data on reactor coolant flow coastdown following a reactor coolant pump sheared shaft accident, (3) an average measured value of 22.5 psid for the pressure differential across the steam generators at full flow, and (4) the maximum time delay of 1.2 seconds previously assumed in the Palo Verde safety analysis for a reactor trip following a sheared reactor coolant pump shaft accident. The derived value was then increased to account for calibration uncertainties, equipment inaccuracies, setpoint drift, and temperature effects. This evaluation resulted in an allowable value of 11.7 psid for the FLOOR parameter. An additional conservatism of 0.2 psid was included to obtain the new setpoint of 11.9 psid for the FLOOR parameter.

The value of the parameter BAND was selected at 11.0 psid to minimize interference from process noise. The value for BAND was then decreased to account for calibration uncertainties, equipment inaccuracies, setpoint drift, and temperature effects, resulting in a allowable value of 10.2 psid. This value was further reduced by 0.2 psid for added conservatism, to obtain the new setpoint of 10.0 psid for the BAND parameter.

The value for the parameter RATE was derived using data relating to a four reactor coolant pump coastdown event, resulting in an allowable value of 0.118 psi/sec. This rate was reduced to 0.115 psi/sec to obtain the new setpoint for the RATE parameter. This setpoint is conservative by a factor of 8 when used in conjunction with BAND for the sheared pump shaft accident analysis. The

value of RATE is sufficiently low to ensure a reactor trip before the FLOOR value is reached following a reduction in process flow due to a sheared pump shaft at full power. Therefore, the values for the parameters of FLOOR, BAND, and RATE, which are based, in part, on a measured pressure differential of 22.5 psid across the steam generators at full flow, are conservative for the required protective LRCF function.

Based on the above evaluation, the staff concludes that the licensees' proposed LRCF trip setpoints are acceptable. This acceptance is based on the determination that the new LRCF trip setpoints would still assure a reactor trip at appropriate times following a postulated RCP sheared shaft accident and that they are supported by the existing safety analysis for Palo Verde. In addition, the modified process response time of 0.58 seconds for the LCRF trip function is acceptable since it has sufficient conservatism with respect to actual test data of 0.35 seconds.

In their submittal, the licensees also indicated that the LRCF trip serves as a backup to the core protection calculation (CPC) trip function for a main steam line break accident with a concurrent loss of offsite power. However, the licensees have not provided, for staff review, the results of an analysis of such an accident using the proposed LRCF setpoints. Without this information, the staff could not conclude that the proposed setpoints of the LRCF trip would also protect against the main steam line break accident. Also, the licensees indicated that the setpoint values of the LRCF trip for the main steam line break accident with loss of offsite power were chosen such that a coolable core geometry is maintained. The staff does not consider this design criterion appropriate since the radiological consequences of such an accident may exceed the 10 CFR 100 guidelines even though coolable core geometry is maintained. The acceptable criteria for this accident is that the radiological consequences of the accident be within the limits of 10 CFR 100 guidelines. Based on the above considerations, the staff cannot conclude that the LRCF trip function also provides protection against a main steam line break accident outside containment with a concurrent loss of offsite power.

In its letter, dated August 26, 1986, the licensees stated that the primary protection for the main steam line break accident with loss of offsite power is provided by the CPCs. The licensees also stated that there are not any analyzed conditions that would result in the inability of the safety grade CPCs to provide the required protection for this event. Based on the above, the staff concludes that the LCRF trip function need not be considered as a licensing requirement for this event.

4.0 CONTACT WITH STATE OFFICIAL

The Arizona Radiation Regulatory Agency has been advised of the proposed determination of no significant hazards consideration with regard to this request for change to the Technical Specifications. No comments were received.

5.0 ENVIRONMENTAL CONSIDERATIONS

These amendments involve changes in the installation or use of facility components located within the restricted area. The staff has determined that the amendments involve no significant increase in the amounts 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 previously issued proposed findings that the amendments involve no significant hazards consideration, and there has been no public comment on such findings. Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR Sec. 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need to be prepared in connection with the issuance of these amendments.

6.0 CONCLUSION

The staff 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 these amendments will not be inimical to the common defense and security or to the health and safety of the public. We, therefore, conclude that the proposed changes are acceptable.

Dated: October 7, 1986