Palo Verde Nuclear
Generating Station

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**10 CFR 50.90**
**10 CFR 50.91**

102-04539-CDM/CKS/RJR
February 28, 2001

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-37
Washington, DC 20555

Dear Sirs:

**SUBJECT:** **Palo Verde Nuclear Generating Station (PVNGS)**
**Units 1, 2, and 3**
**Docket Nos. STN 50-528, 50-529, 50-530**
**License Amendment Request**
**Technical Specification 1.1, Definitions**

Pursuant to 10 CFR 50.90, Arizona Public Service Company (APS) hereby requests the following amendment to Technical Specification 1.1, Definitions, for each Palo Verde Nuclear Generating Station (PVNGS) Unit. The proposed amendment discussed in the attachment would allow either an allocated sensor response time or a measured sensor response time for the identified Reactor Protective System (RPS) and Engineered Safety Features Actuation System (ESFAS) pressure sensors when performing response time testing (RTT). This change is based on the NRC approved Technical Specification Task Force (TSTF) Traveler Number 368, Revision 0, "Incorporate CEOG Topical Report to Eliminate Pressure Sensor Response Time Testing"[1] and Combustion Engineering NPSD-1167, Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements."[2]

Based on the responses to the three standards provided for determining whether a significant hazard consideration exists as stated in 10 CFR 50.92, APS has concluded that the proposed amendment involves no significant hazard consideration.

[1] Approved by the NRC on November 28, 2000
[2] Safety Evaluation issued December 5, 2000

A001

APS requests approval of the proposed amendment by August 1, 2001 in order to be implemented prior to PVNGS Unit 3 refueling outage 9. It is requested that 45 days be allowed for implementation of the amendment.

In accordance with the PVNGS Quality Assurance Program, the Plant Review Board and Offsite Safety Review Committee have reviewed and concurred with this proposed amendment. By copy of this letter, this submittal is being forwarded to the Arizona Radiation Regulatory Agency (ARRA) pursuant to 10 CFR 50.91(b)(1).

No commitments are being made to the NRC by this letter.

Should you have any questions, please contact Scott A. Bauer at (623) 393-5978.

Sincerely,

David D Mauldin

CDM/CKS/RJR/kg

Attachments:

1. Notarized Affidavit
2. License Amendment Request Analysis
3. Markup of Technical Specification pages
4. Retyped Technical Specification pages
5. Associated Changes to The Technical Specification Bases (for information only)
6. Associated Changes to The Technical Requirements Manual (for information only)

cc:

| | | |
|---|---|---|
| E. W. Merschoff | (NRC Region IV) | (all w/Attachment) |
| J. N. Donohew | (NRR Project Manager) | |
| J. H. Moorman | (NRC Resident Inspector) | |
| A. V. Godwin | (ARRA) | |

Attachment 1

AFFIDAVIT

STATE OF ARIZONA )
) ss.
COUNTY OF MARICOPA )

I, David Mauldin, represent that I am Vice President Nuclear Engineering and Support, Arizona Public Service Company (APS), that the foregoing document has been signed by me on behalf of APS with full authority to do so, and that to the best of my knowledge and belief, the statements made therein are true and correct.

David Mauldin

Sworn To Before Me This 28th Day Of February, 2001.

Nora E. Meador
Notary Public

"OFFICIAL SEAL"
Nora E. Meador
Notary Public-Arizona
Maricopa County
My Commission Expires 4/6/2003

My Commission Expires

April 6, 2003

Attachment 2

# LICENSE AMENDMENT REQUEST ANALYSIS

Technical Specification 1.1, Definitions

1.0 DESCRIPTION OF PROPOSED AMENDMENT

2.0 BACKGROUND

3.0 SAFETY ANALYSIS

4.0 SIGNIFICANT HAZARDS CONSIDERATION

5.0 ENVIRONMENTAL CONSIDERATION

6.0 REFERENCES

7.0 PRECEDENT

## 1.0 DESCRIPTION OF PROPOSED AMENDMENT

This letter is a request to amend Operating Licenses NPF-41, NPF-51, and NPF-74 for Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3.

The proposed amendment to the PVNGS' Technical Specification (TS) Section 1.1, Definitions, would revise the definition of response time testing (RTT) as it is applied to the Engineered Safety Features (ESF) RTT and the Reactor Protective System (RPS) RTT. In addition to the current method of determining response time, in which a measured sensor response time is obtained, the proposed amendment of the definition would allow substitution of an allocated sensor response time. The sensor response time (measured or allocated) is used in determining that the overall system response time is within Technical Specification limits. The allocated sensor response time would be obtained from the sensor manufacturer or derived from plant data obtained from previous RTT.

This change is based on the approved Technical Specification Task Force (TSTF) Traveler Number 368, Revision 0, "Incorporate Combustion Engineering Owners Group (CEOG) Topical Report to Eliminate Pressure Sensor Response Time Testing" (REF. 6.1) and Combustion Engineering NPSD-1167, Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements " (REF. 6.2)

Reference 6.2 was submitted as a final report to the NRC in May 2000. The NRC staff issued a safety evaluation (SE) for Revision 2 of the topical report on December 5, 2000. The topical report justifies the substitution of an allocated sensor response time for ESF and RPS pressure sensors. To incorporate this change, the definition of ESF RESPONSE TIME and the definition of RPS RESPONSE TIME will be revised. PVNGS will apply this proposed amendment to selected components as approved by the NRC in the aforementioned SER.

The TS Bases for Surveillance Requirement (SR) 3.3.1.13, RPS Response Time; SR 3.3.2.5, RPS Response Time; SR 3.3.5.4, ESF Response Time; and Technical Requirements Manual (TRM) Bases T3.3.100, Supplementary Protection System (SPS) Instrumentation, will be revised to include the provision allowing allocation of response times in lieu of measuring them. A reference to the CEOG Topical Report will also be added to the revised sections of the Technical Specification (TS) Bases and TRM. The TS Bases and TRM changes are included for information as Attachments 5 and 6, respectively.

In summary, this proposed amendment would allow the substitution for selected pressure sensors of an allocated sensor response time either obtained from manufacturer's data or developed from data collected on-site using approved methodology in lieu of performing response time testing of the sensing element.

Implementation of this proposed amendment requires changes to TS Bases SRs 3.3.13, 3.3.2.5, and 3.3.5.4 in accordance with TSTF 386. PVNGS is also processing a change to the TRM Section 3.3.00 which is not part of TSTF 386.

## 2.0 BACKGROUND

The Reactor Protective System (RPS) initiates a reactor trip to protect against violating the core specified acceptable fuel design limits and breaching the Reactor Coolant System (RCS) pressure boundary during anticipated operational occurrences. By tripping the reactor, the RPS also assists the Engineered Safety Features (ESF) systems in mitigating accidents. The Engineered Safety Features Actuation System (ESFAS) initiates necessary safety systems based upon the values of selected unit parameters, to protect against violating core design limits and the RCS pressure boundary during anticipated operational occurrences and ensures acceptable consequences during accidents. Both systems are required to sense process events (pressure, level, etc.), perform signal processing (bistable functions), and actuate control elements via relays in order to accomplish their safety functions. The accident analysis credits these safety functions, and it assumes a certain total response time for each process event.

Current PVNGS TS Section 1.1, Definitions, require measurement of RPS and ESFAS response times to ensure that the protective function performance is consistent with assumptions used in plant safety analyses.

## 3.0 SAFETY ANALYSIS

The Technical Specifications (TS) require PVNGS to demonstrate that protective functions will occur within the time required by the plant accident analysis. This protective function time requirement starts when the process variable, such as pressure or level exceeds the setpoint for that variable and continues until the protective function is accomplished. For example, response time could be from when a parameter exceeds its setpoint until a required pump is turned on, achieves rated speed, and delivers the required flow. Currently, PVNGS performs an in-field measurement of the various response times by testing the entire circuit using a series of sequential steps, overlapping steps, or total steps.

The proposed amendment to TS Section 1.1, Definitions, in addition to the current method of measuring response time, would allow substitution of an allocated sensor response time. This change is based on the approved References 6.1 and 6.2.

The basis for the elimination of response time testing (RTT) is contained in IEEE 338-1977, Section 6.3.4, paragraph 3 (page 11) (REF. 6.3). This section states: "Response time testing of all safety-related equipment, per se, is not required if, in lieu of response time testing, the response time of the safety equipment is verified by functional testing, calibration checks or other tests, or both. This is acceptable if it can be demonstrated that changes in response time beyond acceptable limits are accompanied by changes in performance characteristics which are detectable during routine periodic tests." This IEEE standard was endorsed by Regulatory Guide 1.118, "Periodic Testing of Electric Power and Protection Systems" (REF. 6.4).

In 1991, an Electric Power Research Institute (EPRI) Report, NP-7243, "Investigation of Response Time Testing Requirements" (REF. 6.5) was issued. This report included a failure mode and effects analysis of certain sensors as well as an evaluation of response time test data. The report determined that for the selected sensors, any failure that will affect the response time characteristics of the sensors would also affect the calibration and other routine surveillances. Therefore, a separate response time test is not required to demonstrate response time assumptions used in the Final Safety Analysis Report (FSAR).

Reference 6.2 only allows substitution of an allocated response time for the sensor and leaves intact the requirement to measure the response time of the rest of the system performing the protective function. Since the time required by the accident analysis is the summation of all response times of components within the protective function, some assumed value for the sensor response time must be used in lieu of an actual measured value to determine the overall protective system response time. This assumed value is that time allocated to the response of the sensor. Reference 6.2 indicates that these values are derived from two sources: either from the original equipment manufacturer or from a statistical analysis of the results of previous RTTs. If a statistical analysis is performed, it must be sufficiently conservative to ensure that the allocated response time assigned to the sensor will be valid for 95 percent of the population of sensors, with a 95 percent confidence level. Methodology for this determination is contained in NUREG- 1475, "Applying Statistics," April 1994 (REF. 6.6). PVNGS uses this methodology.

Reference 6.5 is the report upon which the CEOG based Reference 6.2 for elimination of RTT. This EPRI topical report includes several recommendations for actions to ensure sensors are operating correctly and that calibration or other surveillances will provide an accurate indication that the dynamic characteristics of the instrument will be accurately reflected in a static calibration. The CEOG has included these recommendations in its topical report and has suggested that utilities pursuing elimination of sensor RTT incorporate the recommended actions into their revised RTT program. The recommendations of Reference 6.5 and the PVNGS responses are as follows:

1. Perform a hydraulic RTT prior to installation of a new transmitter/switch or following refurbishment of the transmitter/switch (e.g., sensor cell or variable damping components) to determine an initial sensor-specific response time value. The power interrupt test is an alternate method to use on force-balance transmitters; the purpose of this test is to verify sensor response time is within the limits of the allocated value for the transmitter function.

   PVNGS RESPONSE:

   PVNGS procedures 36ST-9SB41, PPS Transmitter Response Time Test Inside Containment (REF. 6.7), and 36ST-9SB51, PPS Transmitter Response Time Test Outside Containment (REF. 6.8), for replacement transmitters currently contain the information necessary to establish initial response times for replacement transmitters.

2. For transmitters and switches that use capillary tubes, RTT should be performed after initial installation and after any maintenance or modification activity that could damage the capillary tubes.

   PVNGS RESPONSE:

   This is not applicable to Palo Verde. The transmitters associated with the proposed amendment do not use capillary tubes.

3. Perform periodic drift monitoring on all Rosemount pressure and differential pressure transmitters, models 1151, 1152, 1153 and 1154. Guidance on drift monitoring can be found in EPRI NP-7121 and Rosemount Technical Bulletins. Drift monitoring intervals should be based on utility response to NRC Bulletin 90-01.

PVNGS RESPONSE:

On March 9, 1990 the NRC issued NRC Bulletin No. 90-01, Loss of Fill-Oil in Transmitters Manufactured by Rosemount (REF. 6.9) and on December 22, 1992, Supplement 1 to this bulletin was issued. PVNGS provided responses to the NRC detailing the actions being taken in response to the bulletin in letters 161-03348, dated July 20, 1990 (REF. 6.10) and 102-02448, dated March 12, 1993 (REF. 6.11). On March 8, 1995, the NRC requested additional justification regarding the refueling cycle test interval commitment specified in PVNGS' response. The additional justification was provided on October 3, 1995 in letter 102-03495-WLS/SAB/DRL (REF. 6.12).

Since PVNGS' original response to Bulletin 90-01, several transmitters have been removed from the enhanced monitoring program. These transmitters were replaced with Rosemount transmitters having sensors that were manufactured after July 11, 1989 and thus are exempted from the trending requirements specified by the NRC bulletin. The following is a listing of these transmitters by instrument number:

| | | | |
|---|---|---|---|
| 1JRCAPT0190A | 1JRCAPT0199A | 1JRCBPT0190B | 1JRCCPT0105 |
| 1JRCDPT0106 | 2JRCAPT0190A | 2JRCBPT0190B | 2JRCCPT0105 |
| 2JRCDPT0106 | 3JCHAPT0212 | 3JRCAPT0190A | 3JRCBPT0190B |
| 3JRCCPT0105 | 3JRCDPT0106 | 3JSGBPT0321 | |

In PVNGS' response to NRC Bulletin 90-01, Supplement 1, Requested Action 1.d, a commitment was made to monitor the four transmitters per unit that monitor the pressures of the Atmospheric Dump Valve Nitrogen Accumulators. In Reference 6.12, the NRC was notified that the following transmitters were also being removed from the enhanced surveillance monitoring program. These transmitters were removed because they do not perform an active safety-related function. The following is a listing of the instruments that were removed from the enhanced monitoring program:

| | | | |
|---|---|---|---|
| 1JSGAPT0308 | 1JSGAPT0315 | 1JSGBPT0301 | 1JSGBPT0321 |
| 2JSGAPT0308 | 2JSGAPT0315 | 2JSGBPT0301 | 2JSGBPT0321 |
| 3JSGAPT0308 | 3JSGAPT0315 | 3JSGBPT0301 | 3JSGBPT0321 |

Even though these transmitters are no longer part of our committed enhanced surveillance-monitoring program, their operation is still being monitored. This data was evaluated and there was no indication that any of these transmitters are experiencing any degradation in performance that would be indicative of a fill-fluid loss.

The following listing are the transmitters that are still part of the enhanced monitoring program PVNGS committed to as part of its response to NRC Bulletin 90-01, Supplement 1:

| | | | |
|---|---|---|---|
| 1JCHAPT0212 | 1JCHBFT0212 | 1JRCBPT0199B | 1JRCCPT0199C |
| 1JRCDPT0199D | 2JCHAPT0212 | 2JCHBFT0212 | 2JRCAPT0199A |
| 2JRCBPT0199B | 2JRCCPT0199C | 2JRCDPT0199D | 3JCHBFT0212 |
| 3JRCAPT0199A | 3JRCBPT0199B | 3JRCCPT0199C | 3JRCDPT0199D |

The calibration data for these transmitters is trended and analyzed to identify any indication of incipient failure due to loss of fill fluid. These transmitters have been

operating continuously since at least 1987. The Unit 1 transmitters have been in-service since initial start-up in 1985. Evaluation of this calibration data is performed using the trending criteria provided by Rosemount in Technical Bulletin No. 4 issued on December 22, 1989 (REF. 6.13). The evaluations performed to date have not identified any indication that any of these transmitters are experiencing any degradation in performance that would be indicative of a fill-fluid loss.

4. If variable damping is used, implement a method to ensure that the potentiometer is at the required setting and cannot be inadvertently changed. This approach should eliminate the need for RTT to detect a variable damping failure mode. Otherwise, RTT each transmitter by hydraulic or electronic white noise analysis methods, at a minimum, following each transmitter calibration.

   PVNGS RESPONSE:

   This is not applicable to Palo Verde. The transmitters associated with the proposed amendment do not use variable damping.

This proposed amendment is based on the identified CEOG, EPRI, and NUREG documents associated with Technical Specification Task Force (TSTF) Traveler Number 368, Revision 0. These documents provide adequate justification and guidance for determining allocated sensor response time as well as adequate justification that failed sensors will be identified by other surveillance testing that is not affected by this amendment request. As a result, this proposed amendment does not change, degrade, or prevent actions described or assumed in any accident. It will not alter any assumptions previously made in evaluating radiological consequences or affect any fission product barriers. It does not increase any challenges to safety systems. Therefore, this proposed amendment would not increase or have any impact on the consequences of events described and evaluated in Chapter 6 or Chapter 15 of the PVNGS UFSAR.

## 4.0 SIGNIFICANT HAZARDS CONSIDERATION

### 4.1 10 CFR 50.92(c)

APS has evaluated whether or not a significant hazards consideration is involved with the proposed amendment(s) by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   No. The proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

   The proposed amendment to Technical Specification (TS) 1.1, Definitions, allows substitution of an allocated sensor response time in lieu of measuring sensor response time. Response time is not an initiator of any accident previously evaluated. The allocated pressure sensor response times allowed in lieu of measurement have been determined to adequately represent the response time of the components such that the safety

systems utilizing those components will continue to perform their accident mitigation function as assumed in the safety analysis. Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   No. The proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

   The proposed amendment to TS 1.1, Definitions, allows the substitution of an allocated sensor response time in lieu of measuring sensor response time testing. The proposed change does not involve a physical alteration of the plant (no new or different type of equipment will be installed) or a change in the methods governing normal plant operation. The use of allocated response times in lieu of measured response times result in no physical change to the plant. Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

   No. The proposed amendment does not involve a significant reduction in a margin of safety.

   The proposed amendment to TS 1.1, Definitions, allows the substitution of an allocated sensor response time in lieu of measured sensor response time for certain pressure sensors. The allocated pressure sensor response times allowed in lieu of measurement have been determined to adequately represent the response time of the components such that the safety systems utilizing those components will continue to perform their accident mitigation function as assumed in the safety analysis. Therefore, this change does not involve a significant reduction in a margin of safety.

Based on the above, APS concludes that the activities associated with the proposed amendment(s) present no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

## 5.0 ENVIRONMENTAL CONSIDERATION

APS has determined that the proposed amendment involves no changes in the amount or type of effluent that may be released offsite, and results in no increase in individual or cumulative occupational radiation exposure. As described above, the proposed TS amendment involves no significant hazards consideration and, as such, meets the eligibility criteria for categorical exclusion set forth in 10CFR 51.22(c)(9).

## 6.0 REFERENCES


6.1 Technical Specification Task Force Traveler Number 368, Revision 0, Incorporate Combustion Engineering Owners Group Topical Report to Eliminate Pressure Sensor Response Time Testing

6.2. Combustion Engineering NPSD-1167, Revision 2, Elimination of Pressure Sensor Response Time Testing Requirements – Combustion Engineering Owners Group Task 1070

6.3. IEEE 338-1977, Standard Criteria for the Periodic Testing of Nuclear Power Generating Station Safety Systems

6.4. Regulatory Guide 1.118, Periodic Testing of Electric Power and Protection Systems

6.5. EPRI Report, NP-7243, Investigation of Response Time Testing Requirements, Final Report May 1991

6.6. NUREG-1475, Applying Statistics, April 1994

6.7. PVNGS Surveillance Test Procedure 36ST-9SB41, PPS Transmitter Response Time Test Inside Containment

6.8. PVNGS Surveillance Test Procedure 36ST-9SB51, PPS Transmitter Response Time Test Outside Containment

6.9. NRC Bulletin No. 90-01, Loss of Fil-Oil in Transmitters Manufactured by Rosemount, Dated March 9, 1990

6.10. PVNGS Letter 161-03348, dated July 20, 1990, From W. F. Conway to NRC, Response to Actions Requested of NRC Bulletin 90-01

6.11. PVNGS Letter 102-02448, dated March 12, 1993, From W. F. Conway to NRC, Response to Actions Requested by NRC Bulletin 90-01, Supplement 1

6.12. PVNGS Letter 102-03495, dated October 3, 1995, From W. L. Stewart to NRC, Response to Request for Additional Information Concerning Actions Requested by NRC Bulletin 90-01, Supplement 1

6.13. Rosemount Technical Bulletin No. 4,December 22, 1989


## 7.0 PRECEDENT

Similar amendment requests have been approved for the following facilities:

| Facility | Amendment #(s) | Approval Date | Accession # |
|---|---|---|---|
| Limerick 1, 2 | 132, 93 | December 14, 1998 | 9812230310 |
| Sequoyah 1, 2 | 251, 242 | February 29, 2000 | ML003687946 |
| Summer | 146 | August 29, 2000 | ML003746060 |
| Millstone 3 | 187 | November 03, 2000 | ML003755285 |

Attachment 3

**Marked-up Technical Specifications Pages**

Units 1, 2, and 3: Pages 1.1-4 and 1.1-6

1.1 Definitions (continued) LDCR 00-T008

| | |
|---|---|
| ENGINEERED SAFETY FEATURE (ESF) RESPONSE TIME | The ESF RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ESF actuation setpoint at the channel sensor until the ESF equipment is capable of performing its safety function (i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc.). Times shall include diesel generator starting and sequence loading delays, where applicable. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. In lieu of measurement, response time may be verified for selected components provided that the components and methodology for verification have been previously reviewed and approved by the NRC. |
| $K_{n-1}$ | $K_{n-1}$ is the K effective calculated by considering the actual CEA configuration and assuming that the fully or partially inserted full-length CEA of highest worth is fully withdrawn. |
| LEAKAGE | LEAKAGE shall be:<br>a. Identified LEAKAGE<br>1. LEAKAGE, such as that from pump seals or valve packing (except reactor coolant pump (RCP) seal water injection or leakoff), that is captured and conducted to collection systems or a sump or collecting tank;<br>2. LEAKAGE into the containment atmosphere from sources that are both specifically located and known either not to interfere with the operation of leakage detection systems or not to be pressure boundary LEAKAGE; or<br>3. Reactor Coolant System (RCS) LEAKAGE through a steam generator (SG) to the Secondary System.<br>b. Unidentified LEAKAGE<br>All LEAKAGE that is not identified LEAKAGE; |

1.1 Definitions (continued) LDCR 00-T008

| | |
|---|---|
| RATED THERMAL POWER (RTP) | RTP shall be a total reactor core heat transfer rate to the reactor coolant of 3876 MWt. |
| REACTOR PROTECTIVE SYSTEM (RPS) RESPONSE TIME | The RPS RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its RPS trip setpoint at the channel sensor until electrical power to the CEAs drive mechanism is interrupted. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. In lieu of measurement, response time may be verified for selected components provided that the components and methodology for verification have been previously reviewed and approved by the NRC. |
| SHUTDOWN MARGIN (SDM) | SDM shall be the instantaneous amount of reactivity by which the reactor is subcritical or would be subcritical from its present condition assuming:<br><br>a. All full length CEAs (shutdown and regulating) are fully inserted except for the single CEA of highest reactivity worth, which is assumed to be fully withdrawn. With any full length CEAs not capable of being fully inserted, the withdrawn reactivity worth of these CEAs must be accounted for in the determination of SDM and<br><br>b. There is no change in part length CEA position. |

**Retyped Technical Specifications Pages**

Units 1, 2, and 3: Pages 1.1-4 and 1.1-6

1.1 Definitions (continued)

| | |
|---|---|
| ENGINEERED SAFETY FEATURE (ESF) RESPONSE TIME | The ESF RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ESF actuation setpoint at the channel sensor until the ESF equipment is capable of performing its safety function (i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc.). Times shall include diesel generator starting and sequence loading delays, where applicable. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. In lieu of measurement, response time may be verified for selected components provided that the components and methodology for verification have been previously reviewed and approved by the NRC. |
| $K_{n-1}$ | $K_{n-1}$ is the K effective calculated by considering the actual CEA configuration and assuming that the fully or partially inserted full-length CEA of highest worth is fully withdrawn. |
| LEAKAGE | LEAKAGE shall be:<br>a. Identified LEAKAGE<br>1. LEAKAGE, such as that from pump seals or valve packing (except reactor coolant pump (RCP) seal water injection or leakoff), that is captured and conducted to collection systems or a sump or collecting tank;<br>2. LEAKAGE into the containment atmosphere from sources that are both specifically located and known either not to interfere with the operation of leakage detection systems or not to be pressure boundary LEAKAGE; or<br>3. Reactor Coolant System (RCS) LEAKAGE through a steam generator (SG) to the Secondary System. |

(continued)

1.1 Definitions

| | |
|---|---|
| LEAKAGE (continued) | b. Unidentified LEAKAGE<br><br>All LEAKAGE that is not identified LEAKAGE;<br><br>c. Pressure Boundary LEAKAGE<br><br>LEAKAGE (except SG LEAKAGE) through a nonisolable fault in an RCS component body, pipe wall, or vessel wall. |
| MODE | A MODE shall correspond to any one inclusive combination of core reactivity condition, power level, cold leg reactor coolant temperature, and reactor vessel head closure bolt tensioning specified in Table 1.1-1 with fuel in the reactor vessel. |
| NEUTRON RATED THERMAL POWER (NRTP) | The indicated neutron flux at RTP. |
| OPERABLE - OPERABILITY | A system, subsystem, train, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s) and when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its specified safety function(s) are also capable of performing their related support function(s). |
| PHYSICS TESTS | PHYSICS TESTS shall be those tests performed to measure the fundamental nuclear characteristics of the reactor core and related instrumentation. These tests are:<br><br>a. Described in Chapter 14, Initial Test Program of the UFSAR;<br><br>b. Authorized under the provisions of 10 CFR 50.59; or<br><br>c. Otherwise approved by the Nuclear Regulatory Commission. |

(continued)

1.1 Definitions (continued)

| | |
|---|---|
| RATED THERMAL POWER (RTP) | RTP shall be a total reactor core heat transfer rate to the reactor coolant of 3876 MWt. |
| REACTOR PROTECTIVE SYSTEM (RPS) RESPONSE TIME | The RPS RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its RPS trip setpoint at the channel sensor until electrical power to the CEAs drive mechanism is interrupted. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured. In lieu of measurement, response time may be verified for selected components provided that the components and methodology for verification have been previously reviewed and approved by the NRC. |
| SHUTDOWN MARGIN (SDM) | SDM shall be the instantaneous amount of reactivity by which the reactor is subcritical or would be subcritical from its present condition assuming:<br>a. All full length CEAs (shutdown and regulating) are fully inserted except for the single CEA of highest reactivity worth, which is assumed to be fully withdrawn. With any full length CEAs not capable of being fully inserted, the withdrawn reactivity worth of these CEAs must be accounted for in the determination of SDM and<br>b. There is no change in part length CEA position. |

(continued)

Attachment 5

**Associated Changes To The PVNGS Technical Specification Bases**

(Information Only)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.12

SR 3.3.1.12 is a CHANNEL FUNCTIONAL TEST similar to SR 3.3.1.7, except SR 3.3.1.12 is applicable only to operating bypass functions and is performed once within 92 days prior to each startup. Proper operation of operating bypass permissives is critical during plant startup because the operating bypasses must be in place to allow startup operation and must be automatically removed at the appropriate points during power ascent to enable certain reactor trips. Consequently, the appropriate time to verify operating bypass removal function OPERABILITY is just prior to startup. The allowance to conduct this Surveillance within 92 days of startup is based on the reliability analysis presented in topical report CEN-327, "RPS/ESFAS Extended Test Interval Evaluation" (Ref. 9). Once the operating bypasses are removed, the bypasses must not fail in such a way that the associated trip Function gets inadvertently bypassed. This feature is verified by the trip Function CHANNEL FUNCTIONAL TEST, SR 3.3.1.7. Therefore, further testing of the operating bypass function after startup is unnecessary.

SR 3.3.1.13

This SR ensures that the RPS RESPONSE TIMES are verified to be less than or equal to the maximum values assumed in the safety analysis. Individual component response times are not modeled in the analyses. The analyses model the overall or total elapsed time, from the point at which the parameter exceeds the trip setpoint value at the sensor to the point at which the RTCBs open. Response times are ~~conducted~~ verified on an 18 month STAGGERED TEST BASIS. This results in the interval between successive surveillances of a given channel of n x 18 months, where n is the number of channels in the function. The Frequency of 18 months is based upon operating experience, which has shown that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences. Response time testing may be performed at power on a single channel or during plant outages when the equipment is not required to be operable. Testing may be performed in one measurement or in overlapping segments, with verification that all components are tested.

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SURVEILLANCE REQUIREMENTS

SR 3.3.1.13 (continued)

Response time may be verified by any series of sequential, overlapping or total channel measurements, including allocated sensor response time, such that the response time is verified. Allocations for sensor response times may be obtained from records of test results, vendor test data, or vendor engineering specifications. Topical Report CE NPSD-1167-A, "Elimination of Pressure Sensor Response Time Testing Requirements," (Ref. 12) provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the Topical Report. Response time verification for other sensor types must be demonstrated by test. The allocation of sensor response times must be verified prior to placing a new component in operation and reverified after maintenance that may adversely affect the sensor response time.

A Note is added to indicate that the neutron detectors are excluded from RPS RESPONSE TIME testing because they are passive devices with minimal drift and because of the difficulty of simulating a meaningful signal. Slow changes in detector sensitivity are compensated for by performing the daily calorimetric calibration (SR 3.3.1.4).

REFERENCES

1. 10 CFR 50, Appendix A, GDC 21.
2. 10 CFR 100.
3. NRC Safety Evaluation Report, July 15, 1994.
4. IEEE Standard 279-1971, April 5, 1972.
5. UFSAR, Chapters 6 and 15.
6. 10 CFR 50.49.
7. "Calculation of Trip Setpoint Values, Plant Protection System". CEN-286(v), or Calculation 13-JC-SG-203 for the Low Steam Generator Pressure Trip function.

8. UFSAR, Section 7.2.

9. CEN-327, June 2, 1986, including Supplement 1, March 3, 1989, and Calculation 13-JC-SB-200.

10. CEN-PSD-335-P, "Functional Design Requirements for a Core Protection Calculator."

11. CEN-PSD-336-P, "Functional Design Requirements for a Control Element Assembly Calculator."

12. CEOG Topical Report CE NPSD-1167-A, "Elimination of Pressure Sensor Response Time Testing Requirements."

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.2.4 (continued)

because of the difficulty of simulating a meaningful signal. Slow changes in detector sensitivity are compensated for by performing the daily calorimetric calibration (SR 3.3.1.4).

SR 3.3.2.5

This SR ensures that the RPS RESPONSE TIMES are verified to be less than or equal to the maximum values assumed in the safety analysis. Individual component response times are not modeled in the analyses. The analyses model the overall or total elapsed time, from the point at which the parameter exceeds the trip setpoint value at the sensor to the point at which the RTCBs open. Response times are ~~conducted~~ verified on an 18 month STAGGERED TEST BASIS. This results in the interval between successive tests of a given channel of n x 18 months, where n is the number of channels in the Function. The 18 month Frequency is based upon operating experience, which has shown that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences. Response time testing may be performed at power on a single channel or during plant outages when the equipment is not required to be operable. Testing may be performed in one measurement or in overlapping segments, with verification that all components are tested.

Response time may be verified by any series of sequential, overlapping or total channel measurements, including allocated sensor response time, such that the response time is verified. Allocations for sensor response times may be obtained from records of test results, vendor test data, or vendor engineering specifications. Topical Report CE NPSD-1167-A, "Elimination of Pressure Sensor Response Time Testing Requirements," (Ref. 7) provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the Topical Report. Response time verification for other sensor types must be demonstrated by test. The allocation of sensor response times must be verified prior to placing a new component in operation and reverified after maintenance that may adversely affect the sensor response time.

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REFERENCES (continued)

5. NRC Safety Evaluation Report, July 15, 1994.

6. CEN-327, June 2, 1986, including Supplement 1, March 3, 1989, and Calculation 13-JC-SB-200.

7. CEOG Topical Report CE NPSD-1167-A, "Elimination of Pressure Sensor Response Time Testing Requirements."

BASES

SURVEILLANCE REQUIREMENTS

SR 3.3.5.2 (continued)

The as found and as left values must also be recorded and reviewed for consistency with the assumptions of the surveillance interval extension analysis. The requirements for this review are outlined in Reference 9.

SR 3.3.5.3

CHANNEL CALIBRATION is a complete check of the instrument channel including the detector and the bypass removal functions. The Surveillance verifies that the channel responds to a measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift between successive calibrations to ensure that the channel remains operational between successive surveillances. CHANNEL CALIBRATIONS must be performed consistent with the plant specific setpoint analysis.

The as found and as left values must also be recorded and reviewed for consistency with the assumptions of the surveillance interval extension analysis. The requirements for this review are outlined in Reference 9.

The 18 month frequency is based on operating experience which has shown these components usually pass the Surveillance when performed on the 18 month Frequency. With proper precautions the channel calibration can be performed with the reactor at power.

SR 3.3.5.4

This Surveillance ensures that the train actuation response times are within the maximum values assumed in the safety analyses.

Response time testing acceptance criteria are included in Reference 8.

Response time may be verified by any series of sequential, overlapping or total channel measurements, including allocated sensor response time, such that the response time is verified. Allocations for sensor response times may be obtained from records of test results, vendor test data, or vendor engineering specifications. Topical Report CE NPSD-

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1167-A, "Elimination of Pressure Sensor Response Time Testing Requirements," (Ref. 10) provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the Topical Report. Response time verification for other sensor types must be demonstrated by test. The allocation of sensor response times must be verified prior to placing a new component in operation and re-verified after maintenance that may adversely affect the sensor response time.

ESF RESPONSE TIME tests are ~~conducted~~ verified on a STAGGERED TEST BASIS of once every 18 months. The 18 month Frequency is consistent with the typical industry refueling cycle and is based upon plant operating experience, which shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences.

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SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.5.5

SR 3.3.5.5 is a CHANNEL FUNCTIONAL TEST similar to SR 3.3.5.2, except SR 3.3.5.5 is performed within 92 days prior to startup and is only applicable to operating bypass functions. Since the Pressurizer Pressure – Low operating bypass is identical for both the RPS and ESFAS, this is the same Surveillance performed for the RPS in SR 3.3.1.13.

The CHANNEL FUNCTIONAL TEST for proper operation of the operating bypass permissives is critical during plant heatups because the bypasses may be in place prior to entering MODE 3 but must be removed at the appropriate points during plant startup to enable the ESFAS Function. Consequently, just prior to startup is the appropriate time to verify operating bypass function OPERABILITY. Once the operating bypasses are removed, the bypasses must not fail in such a way that the associated ESFAS Function is inappropriately bypassed. This feature is verified by SR 3.3.5.2.

The allowance to conduct this test with 92 days of startup is based on the reliability analysis presented in topical report CEN-327, "RPS/ESFAS Extended Test Interval Evaluation" (Ref. 9).

REFERENCES

1. UFSAR, Section 7.3.

2. 10 CFR 50, Appendix A.

3. NRC Safety Evaluation Report, July 15, 1994

4. IEEE Standard 279-1971.

5. UFSAR, Chapter 15.

6. 10 CFR 50.49.

7. "Calculation of Trip Setpoint Valves Plant Protection System", CEN-286(v), or Calculation 13-JC-SG-203 for the Low Steam Generator Pressure Trip Function.

8. UFSAR, Section 7.2.

9. CEN-327, May 1986, including Supplement 1, March 1989, and Calculation 13-JC-SB-200.

10. CEOG Topical Report CE NPSD-1167-A, "Elimination of Pressure Sensor Response Time Testing Requirements."

Attachment 6

**Associated Changes To The PVNGS Technical Requirements Manual**

(Information Only)

The AZIMUTHAL POWER TILT allowance used in the CPCs is defined as the value of CPC addressable constant TR-1.0.

T3.3.100 Supplementary Protection System (SPS) Instrumentation

The OPERABILITY of the reactor protective and Engineered Safety Features Actuation Systems instrumentation and bypasses ensures that (1) the associated Engineered Safety Features Actuation action and/or reactor trip will be initiated when the parameter monitored by each channel or combination thereof reaches its setpoint, (2) the specified coincidence logic is maintained, (3) sufficient redundancy is maintained to permit a channel to be out of service for testing or maintenance, and (4) sufficient system functional capability is available from diverse parameters.

The OPERABILITY of these systems is required to provide the overall reliability, redundancy, and diversity assumed available in the facility design for the protection and mitigation of accident and transient conditions. The integrated operation of each of these systems is consistent with the assumptions used in the safety analyses.

The quarterly frequency for the channel functional tests for these systems is based on the analyses presented in the NRC approved topical report CEN-327-A, "RPS/ESFAS Extended Test Interval Evaluation," and CEN-327-A, Supplement 1, and calculation 13-JC-SB-200-Rev. 01.

The ~~measurement~~ verification of response time at the specified frequencies provides assurance that the protective and ESF action function associated with each channel is completed within the time limit assumed in the safety analyses. The instrumentation response times are made up of the time to generate the trip signal at the detector (sensor response time) and the time for the signal to interrupt power to the CEA drive mechanism (signal or trip delay time).

~~Response time may be demonstrated by any series of sequential, overlapping, or total channel test measurements provided that such tests demonstrate the total channel response time as defined. Sensor response time verification may be demonstrated by either (1) in place, onsite, or offsite test measurements or (2) utilizing replacement sensors with certified response times.~~

Response time may be verified by any series of sequential, overlapping or total channel measurements, including allocated sensor response time, such that the response time is verified. Allocations for sensor response times may be obtained from records of test results, vendor test data, or vendor engineering specifications. Topical Report CE NPSD-1167-A, "Elimination of

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Pressure Sensor Response Time Testing Requirements," provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the Topical Report. Response time verification for other sensor types must be demonstrated by test. The allocation of sensor response times must be verified prior to placing a new component in operation and reverified after maintenance that may adversely affect the sensor response time.

T3.3.101 Radiation Monitoring Instrumentation

The OPERABILITY of the radiation monitoring channels ensures that: (1) the radiation levels are continually measured in the areas served by the individual channels and (2) the alarm or automatic action is initiated when the radiation level trip setpoint is exceeded.

T3.3.102 Incore Detectors

The OPERABILITY of the incore detectors with the specified minimum complement of equipment ensures that the measurements obtained from use of this system accurately represent the spatial neutron flux distribution of the reactor core.

T3.3.103 Seismic Monitoring

The OPERABILITY of the seismic instrumentation ensures that sufficient capability is available to promptly determine the magnitude of a seismic event and evaluate the response of those features important to safety. This capability is required to permit comparison of the measured response to that used in the design basis for the facility to determine if plant shutdown is required pursuant to Appendix A of 10 CFR Part 100. The instrumentation is consistent with the recommendations of Regulatory Guide 1.12, "Instrumentation for Earthquakes," April 1974 as identified in the PVNGS FSAR.

T3.3.104 Meteorological Instrumentation

The OPERABILITY of the meteorological instrumentation ensures that sufficient meteorological data are available for estimating potential radiation doses to the public as a result of routine or accidental release of radioactive materials to the atmosphere. This capability is required to evaluate the need for initiating protective measures to protect the health and safety of the public and is consistent with the recommendations of Regulatory Guide 1.23 "Onsite Meteorological Programs," February 1972. Wind speeds less than 0.6 MPH cannot be measured by the meteorological instrumentation.

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