ABB

March 14, 2000
LD-2000-0016

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: **Submittal of Errata for CE NPSD-1167 Rev 01, "Joint Application Report for Elimination of Pressure Sensor Response Time Testing Requirements" (Non-Proprietary Information)**

Reference: CEOG Letter, R. Phelps to U.S. NRC, "Transmittal of RTT Elimination Topical Report CE NPSD-1167, Rev 01," CEOG-99-304, 9/30/99

The C-E Owners Group submitted topical report CE NPSD-1167 for NRC review and approval via the Reference letter. The purpose of this letter is to forward errata to be incorporated into the subject report; these errata clarify certain ambiguities identified during the review of the topical report.

The attached replacement pages document the clarifications made to CE NPSD-1167, Rev 01. Following completion of the staff review and issuance of its safety evaluation, the CEOG will incorporate this errata and any other updates determined to be necessary in the approved "-A" version of the report in accordance with the guidelines in NUREG-0390. The approved report will be designated Rev 02.

Please feel free to contact Virgil Paggen of my staff at 860-285-4700 or me if you have any questions.

Sincerely,

Ian C. Rickard, Director
Nuclear Licensing

Attachment:

cc: P. J. Loeser (OWFN, 9 D4)
J. S. Cushing (OWFN, 4 D7)
CEOG subcommittee

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A review of the sensors used in the RPS and ESFAS confirmed that all the sensors were reviewed and approved as candidates for elimination of response time testing by EPRI Report NP-7243. All sensors used in the RPS and ESFAS are Rosemount, Foxboro or WEED.

It is recommended that SCE revise their RTT test program as follows. The current procedure used to determine the response time of the RPS and ESFAS transmitters would be discontinued. In its place an allocated response time would be assigned to each sensor. For the Rosemount transmitters, this allocated value can be obtained from the information contained in Table 3.1 or by review and analysis of the available historical response time data for these sensors. For the Foxboro and WEED transmitters, the vendor does not publish a response time specification. ABB has analyzed the historical data SCE provided for these sensors and calculated a sensor response time to be allocated for each sensor type and model. A summary of this analysis is contained in Appendix C.

These allocated sensor response times would then be added to the actual response time of the remainder of the RPS or ESFAS protection loop as measured by the current existing procedures. This will minimize the impact on the current SCE test procedures and RTT methodology. Once this methodology has been implemented, further response time testing of these transmitters will not be required as long as the conditions of Section 3.4 of this topical report are met.

Table 3.1A below lists the recommended sensor response time allocations for the Foxboro and WEED transmitters utilized by SCE. The allocated values are listed by sensor make, model and function and are based on calculations which utilized historical data for the subject transmitters which was provided to ABB by SCE.

Table 3.1A
Calculated Transmitter Response Time Allocations for San Onofre-2 & 3

Transmitter Function	Transmitter Make and Model	Recommended Transmitter Allocation
Containment Pressure (High/High-High)	Foxboro N-E11DM	430 msec
RWT Level	Foxboro E13DM	610 msec
Pressurizer Press. – High	WEED N-E11GM	135 msec
SG Pressure	WEED N-E11GM	135 msec
SG Level	WEED/Foxboro N-E13DM	520 msec

Should SCE replace any of the existing RPS or ESFAS sensors with one of different manufacture or model number than that which is currently installed, they will need to revisit the sensor response time allocation. If the new sensor is one listed in Table 3.1 or 3.1A then the new sensor response time allocation can be made by utilizing the data available in Tables 3.1 and 3.1A. If the new sensor is not one of those listed in Table 3.1 or 3.1A then the utility must verify that the sensor is a candidate for response time elimination as defined in this report. Once this determination is made the utility may allocate a response time based on historical data for that transmitter type and model if sufficient historical data is available.

added to the measured response time for the remainder of the RPS or ESFAS protection loop and verified to meet the assumptions of the safety analysis. Once this methodology has been implemented, further response time testing of these transmitters will not be required as long as the conditions of Section 3.4 of this topical report are met.

One exception to the above is the sensor utilized for RCS Flow in Unit 1. This sensor is a Rosemount 1154 with a variable damping option. The variable damping is adjustable from 0 to 0.8 sec. Discussions with FPL personnel verified that this adjustable damping is set to the optimum value for this application and sealed. An analysis of the historical data for this sensor was conducted to determine a response time, which could be allocated to these sensors. A summary of this analysis is provided in Appendix C. Table 3.1B below provides the calculated allocation for these sensors. FPL must put in place a method to control the setting of the variable damping adjustment for these sensors as discussed in Section 3.4.

Should St. Lucie 1 or 2 replace any of the existing RPS or ESFAS sensors with one of different manufacture or model number than that which is currently installed, they will need to revisit the sensor response time allocation. If the new sensor is one listed in Table 3.1 then the new sensor response time allocation can be made by utilizing the data available in Table 3.1. If the new sensor is not one of those listed in Table 3.1 then the utility must verify that the sensor is a candidate for response time elimination as defined in this report. Once this determination is made the utility may allocate a response time based on historical data for that transmitter type and model if sufficient historical data is available.

Table 3.1B
Calculated Transmitter Response Time Allocation for Florida Power & Light St. Lucie Unit 1 RCS Flow

Transmitter Function	Transmitter Make and Model	Recommended Transmitter Allocation
RCS FLow	Rosemount 1154HH6RAN0037	380 msec

Entergy (Arkansas Nuclear One- Unit 2)

The procedures used by Arkansas Nuclear One Unit 2 to perform RTT on their RPS and ESFAS functions were reviewed. Prior to 1995, RTT was performed from the input of the sensor to the Trip Circuit Breakers (TCB) for the RPS or from the input of the sensor to the actuating device for the ESFAS. Testing performed in 1995 on Channel D and in 1997 on Channel A measured the response time from the input of the sensor to the output of the actuating bistable on the Bistable Control Panel (BCP) and from the output of the actuating bistable to the TCB for the RPS or from the output of the actuating bistable to the actuating device for ESFAS. The two values were added to determine the total loop response.

ANO-2 has separate procedure numbers for each of the four Channels. Channel A procedure is 2304.112, Channel B are 2304.113, Channel C is 2304.114 and Channel D is 2304.115. With the exception of the Channel being tested and the procedure change in 1995 as discussed above, the procedures are identical and determine the response times from the input of the sensor to the actuating device.

REVISIONS TO TECHNICAL SPECIFICATIONS

This Appendix provides typical changes to Technical Specifications to remove the requirement to perform response time testing of RPS and ESFAS pressure and differential pressure sensors. Each plant's current Tech Specs should be compared with the sections given below to confirm whether or not a License Amendment will be required. The generic Tech Specs statements given below are based on a review of C-E Standard Tech Specs contained in NUREG-1432. Recommended Tech Spec deletions are marked with a double strike-through; text additions are marked with margin bars.

RECOMMENDED TECH SPEC DEFINITIONS

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 any sequence of sequential, overlapping, or total steps such that the entire response time is measured.~~

The response time may be verified by any sequence of sequential, overlapping, or total steps such that the entire response time is measured, or by the summation of allocated sensor response times with the results of actual measured response times for the remainder of the channel.

Reactor Protection 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 CEA drive mechanisms is interrupted. ~~The response time may be measured by any sequence of sequential, overlapping, or total steps such that the entire response time is measured.~~

The response time may be verified by any sequence of sequential, overlapping, or total steps such that the entire response time is measured, or by the summation of allocated sensor response times with the results of actual measured response times for the remainder of the channel.

RECOMMENDED TECH SPEC SURVEILLANCE REQUIREMENTS

SR 3.3.1.14 RPS Instrumentation- Operating (Digital)

Verify RPS RESPONSE TIME is within limits.

[NOTE: Neutron detectors are excluded (from RPS RESPONSE TIME testing).]

Frequency: [18] months on a STAGGERED TEST BASIS.

SR 3.3.5.4 ESFAS Instrumentation (Digital)

Verify ESF RESPONSE TIME is within limits.

Frequency: [18] months on a STAGGERED TEST BASIS.

RECOMMENDED TECH SPEC BASES

Bases for SR 3.3.1.14: RPS Instrumentation – Operating (Digital):

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 verified ~~conducted~~ on a [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 on operating experience, which has shown that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent occurrences. Also, response times cannot be determined at power since equipment operation is required. ~~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 sequence of sequential, overlapping, or total steps, including allocated sensor response time, such that the entire response time is verified. Allocations for sensor response time may be determined from records of test results, vendor test data, or vendor engineering specifications. Topical Report CE NPSD-1167 (Ref A), "Elimination of Pressure Sensor Response Time Testing Requirements," provides a basis for using allocated response times for specific pressure sensors. The allocation for sensor response times must be verified prior to placing a new component in operation and re-verified following maintenance that may adversely affect the sensor response time.

Response time testing acceptance criteria are included in Reference [B].

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).

Bases for SR 3.3.5.4: ESFAS Instrumentation (Digital)

This Surveillance ensures that the train actuation response times are within the maximum values assumed in the safety analyses. Response time may be verified by any sequence of sequential, overlapping, or total steps, including allocated sensor response time, such that the entire response time is verified. Allocations for sensor response time may be determined from records of test results, vendor test data, or vendor engineering specifications. CE NPSD-1167 (Ref A), "Elimination of Pressure Sensor Response Time Testing Requirements," provides a basis for using allocated response times for specific pressure sensors. The allocation for sensor response times must be verified prior to placing a new component in operation and re-verified following maintenance that may adversely affect the sensor response time.

Response time testing acceptance criteria are included in Reference [B].

ESF RESPONSE TIME tests are conducted 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.

The following provides a summary of the analysis performed on the historical response time data for selected sensors currently in use at SCE, and FPL. The purpose of this analysis is to determine a response time based on historical data that can be applied to the subject sensors as they are currently being used.

SCE

SCE currently has WEED/Foxboro sensors installed in the following safety functions:

- Containment Pressure
- RTW Level
- Pressurizer Pressure
- Steam Generator Pressure
- Steam Generator Level

The following is a summary of the analysis performed for each function.

Containment Pressure (Tag Numbers 2PT0351-1,2,3,4/2PT0352-1,2,3,4 & 3PT0351-1,2,3,4/3PT0352-1,2,3,4)

For the Containment Pressure function SCE utilizes a Foxboro model N-E11DM transmitter. A review of the historical data supplied by SCE for this function resulted in the following:

- Data Points – 36
- Maximum response – 423 msec.
- Minimum response – 70 msec.
- Mean value – 192.44 msec.
- Standard Deviation – 108.19 msec.

Using the above data the calculated response time (95/95) to be allocated to this sensor is 425.98 msec or rounded up to 430 msec.

Refueling Water Tank Level (Tag Numbers 2LT0305-1,2,3,4 & 3LT0305-1,2,3,4)

For the RWT function SCE utilizes a Foxboro model E113DM transmitter. A review of the historical data supplied by SCE for this function resulted in the following:

- Data Points – 20
- Maximum response – 650 msec.
- Minimum response – 115 msec.
- Mean value – 271.75 msec.
- Standard Deviation – 139.93 msec.

Using the above data the calculated response time (95/95) to be allocated to this sensor is 607.02 msec or rounded up to 610 msec.

Pressurizer Pressure and Steam Generator Pressure (Tag Numbers 2PT0101-1,2,3,4, 2PT1013-1,2,3,4, 3PT0101-1,,2,3,4 & 3PT1013-1,2,3,4)

For the Pressurizer Pressure and Steam Generator Pressure functions SCE utilizes a WEED model N-E11GM transmitter. A review of the historical data supplied by SCE for this function resulted in the following:
- Data Points – 55
- Maximum response – 170 msec.
- Minimum response – 0 msec.
- Mean value – 59.91 msec.
- Standard Deviation – 35.22 msec.

Using the above data the calculated response time (95/95) to be allocated to this sensor is 131.9 msec or rounded up to 135 msec.

Steam Generator Level (Tag Numbers 2LT1113-1,2,3,4 & 3LT1113-1,2,3,4)

For the Steam Generator Level function SCE utilizes a WEED and Foxboro model N-E13DM transmitter. A review of the historical data supplied by SCE for this function resulted in the following:
- Data Points – 38
- Maximum response – 530 msec.
- Minimum response – 130 msec.
- Mean value – 306.97 msec.
- Standard Deviation – 97.55 msec.

Using the above data the calculated response time (95/95) to be allocated to this sensor is 515.9 msec or rounded up to 520 msec.

FPL

FPL currently has a Rosemount model 1154HH6RAN0037 sensor installed in the RCS Flow loops. This sensor has a variable damping option. Below is a summary of the analysis of the historical data for this sensor:

- Data Points – 16
- Maximum response – 380 msec.
- Minimum response – 138 msec.
- Mean value – 222.5 msec.
- Standard Deviation – 61.44 msec.

Using the above data the calculated response time (95/95) to be allocated to this sensor is 377.57 msec or rounded up to 380 msec.