July 24, 2000

Mr. Ralph Phelps, Chairman
Combustion Engineering Owners Group
Omaha Public Power District
P. O. Box 399
Ft. Calhoun, NE 68023-0399

SUBJECT: ACCEPTANCE FOR REFERENCING OF COMBUSTION ENGINEERING OWNERS GROUP TOPICAL REPORT CE NPSD-1167, REVISION 2, "ELIMINATION OF PRESSURE SENSOR RESPONSE TIME TESTING REQUIREMENTS," MAY 2000 (TAC NO. MA6010)

Dear Mr. Phelps:

The NRC staff has completed its review of Revision 2 of Topical Report CE NPSD-1167, "Elimination of Pressure Sensor Response Time Testing Requirements" which was submitted by the Combustion Engineering Owners Group (CEOG) by letter dated May 12, 2000, and amended by CE letter CEOG-00-171, dated June 6, 2000. The enclosure provides the staff's safety evaluation (SE). The topical report describes a CEOG effort to demonstrate that periodic response time testing (RTT) requirements for selected protection channel sensors in the reactor trip system (RTS) and engineered safety features actuation system (ESFAS) could be eliminated. Upon eliminating the RTT requirements, the total RTS or ESFAS channel response time would be verified by summing an assumed response time with the measured response time of the remainder of the channel.

On the basis of our review, the staff finds that Revision 2 to CE NPSD-1167, as amended by CE letter CEOG-00-171, dated June 6, 2000, is acceptable for referencing in license applications to the extent specified, and under the limitations delineated in the report, and in the enclosed SE. The SE defines the basis for NRC acceptance of the report. The staff has determined that for the sensors and systems specified in NPSD-1167, Revision 2, response time testing is not required to demonstrate satisfactory sensor performance and that other routine surveillance, such as calibrations and drift monitoring, is sufficient to demonstrate satisfactory sensor performance. As discussed with the CEOG, the proposed Standard Technical Specification changes shown in Appendix A are not approved, and will be submitted to the Nuclear Energy Institute Technical Specification Task Force prior to submittal to the NRC.

We do not intend to repeat our review of the matters described in the report, and found acceptable, when the report appears as a reference in license applications, except to assure that the material presented is applicable to the specific plant involved. Our acceptance applies only to matters approved in the report.

In accordance with procedures established in NUREG-0390, "Topical Report Review Status," we request that the CEOG publish an accepted version of this topical report within 3 months of receipt of this letter. The accepted version shall incorporate this letter and the enclosed safety evaluation between the title page and the abstract. It must be well indexed such that

information is readily located. Also, it must contain in appendices historical review information, such as questions and accepted responses, and original report pages that were replaced. The accepted version shall include an "-A" (designating accepted) following the report identification symbol.

Should our criteria or regulations change so that our conclusions as to the acceptability of the report are invalidated, the CEOG and/or the applicants referencing the topical report will be expected to revise and resubmit their respective documentation, or submit justification for the continued applicability of the topical report without revision of their respective documentation.

If you have further questions, you may contact Jack Cushing at 301-415-1424, or on the internet at jxc9@nrc.gov.

Sincerely,

/RA by Stephen Dembek for/

Stuart A. Richards, Director
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Project No. 692

Enclosure: Safety Evaluation

cc w/encl: See next page

information is readily located. Also, it must contain in appendices historical review information, such as questions and accepted responses, and original report pages that were replaced. The accepted version shall include an "-A" (designating accepted) following the report identification symbol.

Should our criteria or regulations change so that our conclusions as to the acceptability of the report are invalidated, the CEOG and/or the applicants referencing the topical report will be expected to revise and resubmit their respective documentation, or submit justification for the continued applicability of the topical report without revision of their respective documentation.

If you have further questions, you may contact Jack Cushing at 301-415-1424, or on the internet at jxc9@nrc.gov.

Sincerely,
/RA by Stephen Dembek for/
Stuart A. Richards, Director
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Project No. 692

Enclosure: Safety Evaluation

cc w/encl: See next page

DISTRIBUTION:
PUBLIC
PDIV-2 Reading
SRichards (RidsNrrDlpmLpdiv)
JCushing (RidsNrrPMJCushing)
EPeyton (RidsNrrLAEPeyton)
JCalvo
WBeckner
PLoeser
Accession No. ML003734797

OFFICE	PDIV-2/PM	PDIV-2/LA	PDIV-2/SC	PDIV/D
NAME	JCushing:lcc	EPeyton	SDembek	SDembek for SRichards
DATE	07/20/00	07/20/00	07/24/00	07/24/00

OFFICIAL RECORD COPY

cc:
Mr. Gordon C. Bischoff, Project Director
CE Owners Group
Combustion Engineering Nuclear Power
M.S. 9615-1932
2000 Day Hill Road
Post Office Box 500
Windsor, CT 06095

Mr. Charles B. Brinkman, Manager
Washington Operations
Combustion Engineering Nuclear Power
12300 Twinbrook Parkway, Suite 330
Rockville, MD 20852

Mr. Ian C. Rickard, Director
Nuclear Licensing
Combustion Engineering Nuclear Power
2000 Day Hill Road
Post Office Box 500
Windsor, CT 06095

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO COMBUSTION ENGINEERING OWNERS GROUP TOPICAL REPORT

CE NPSD-1167, "ELIMINATION OF PRESSURE SENSOR RESPONSE

TIME TESTING REQUIREMENTS"

1.0 INTRODUCTION AND BACKGROUND

The requirement for periodic testing of reactor trip systems is established in Section 50.55a, "Codes and Standards," of 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." Section 50.55a(h)(2), states that: "For nuclear power plants with construction permits issued after January 1, 1971, but before May 13, 1999, protection systems must meet the requirements stated in either IEEE Std. 279, "Criteria for Protection Systems for Nuclear Power Generating Stations," or in IEEE Std. 603-1991, "Criteria for Safety Systems for Nuclear Power Generating Stations," and the correction sheet dated January 30, 1995. For nuclear power plants with construction permits issued before January 1, 1971, protection systems must be consistent with their licensing basis or may meet the requirements of IEEE Std. 603-1991 and the correction sheet dated January 30, 1995." In addition, 10 CFR 50.36(c)(2)(ii)(A) requires a technical specification limiting condition for operation for "installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary." Section 50.36(c)(3), "Surveillance Requirements," also states that: "Surveillance requirements are requirements related to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within the safety limits, and that the limiting conditions of operation will be met." In 1975, the NRC implemented a program that made response time testing (RTT) a requirement of the TS.

In June 1999, the Combustion Engineering Owners Group (CEOG) under the auspices of ABB Combustion Engineering Nuclear Power Company issued Topical Report CE NPSD-1167, "Elimination of Pressure Sensor Response Time Testing Requirements." In CE NPSD-1167, the CEOG proposed eliminating the requirements for RTT of selected pressure sensors in the reactor protection system (RPS), the emergency core cooling system (ECCS), and the isolation actuation system (IAS). In August 1999, the CEOG submitted Revision 1 to CE NPSD-1167 to modify the pressure transmitter allocated response times from values that were based upon historical data collected at the plants to values that are based upon vendor data of expected response times of properly operating instruments. In May 2000, the CEOG submitted Revision 2 to CE NPSD-1167 to incorporate NRC and utility comments and to correct Appendix C calculated values for allocated response times that were based upon historical data, for those sensors where no vendor response time values are available.

Appendix A to CE NPSD-1167, Revision 2 was modified and resubmitted by letter CEOG-00-171, dated June 6, 2000.

The request to eliminate RTT includes plant-specific information on five licensees with a total of 11 nuclear power plants. These licensees are as follows:

Entergy, Arkansas Nuclear One, Unit 2, and Waterford, Unit 3
Arizona Public Service Company (APS), Palo Verde Units 1, 2 and 3
Baltimore Gas & Electric (BGE), Calvert Cliffs Units 1 and 2
Florida Power & Light (FPL), St. Lucie Units 1 and 2
Southern California Edison (SCE), San Onofre Units 2 & 3

The following are the pressure sensors for which the CEOG has requested elimination of RTT:

- Rosemount Differential Pressure or Pressure Transmitters Model 1152 DP, HP, AP, and GP, range codes 3, 4, 5, 6, 7, 8, 9, and 0

- Rosemount 1153 Differential Pressure or Pressure Transmitters Models 1153 D, H, A, and G, range codes 3, 4, 5, 6, 7, 8, and 9

- Rosemount 1154 Differential Pressure or Pressure Transmitters Models DP, HP, and GP, range codes 4, 5, 6, 7, 8, 9, and 0

- Rosemount 1154H Differential Pressure or Pressure Transmitters Models D, H, and S, range codes 4, 5, 6, 7, 8, and 9

- Barton 763 and 763A Pressure Transmitter and 764 Differential Pressure Transmitter

- Foxboro Models N-E11DM, N-E13DM, and E13DM

- Weed Model N-E11GM

The systems in which these sensors are used and where the sensor would no longer be tested for response time, differ depending on the licensee concerned. In general, the request is being made for all RPS and engineered safety feature (ESF) systems in which the above listed sensors are used. The allocated response times to be used, in lieu of actual measured response times when determining that the overall system response time is within TS required limits, is either obtained from the sensor manufacturer or derived from plant data obtained from previous response time tests.

2.0 DISCUSSION

Current standard technical specifications (STS) require nuclear power plants to periodically perform RTT for instrument channels in the RPS, the ECCS, and the IAS. The intent of these tests is to ensure that changes in response time of instrumentation beyond the limits assumed in safety analyses are detected and, combined with instrument calibrations, to ensure that the instrumentation is operating correctly.

The basis for elimination of RTT is contained in IEEE 338-1977, Section 6.3.4, paragraph 3 (page 11), which 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."

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

In CE NPSD-1167, the CEOG has requested elimination of RTT for sensors evaluated in EPRI Report NP-7243 and used by CE plants.

3.0 EVALUATION

The CEOG, in NPSD-1167, depended primarily on the analysis performed in EPRI Report NP-7243. In addition, the CEOG reviewed approximately 1400 sensor data points, and determined that no failures of response time had been detected. With one exception, the sensors for which the CEOG requested elimination of RTT were all subject to the FMEAs contained in the EPRI report, and, therefore, no further analysis was required. The one sensor that was not analyzed in EPRI NP-7243 was Barton Model 763A, used by APS in the Palo Verde units.

The EPRI report had concluded that RTT was not useful in the identification of transmitters that failed response time testing and that calibration and other periodic surveillances would detect transmitter response time failures. The FMEA showed that for the transmitters selected for RTT elimination, any component failure that would affect the response time characteristics would also affect the calibration or surveillance results.

The sensor models and the systems in which these sensors were used varied by plant and will be discussed in Section 3.2, "Plant-Specific Applications," of this safety evaluation (SE).

3.1 Allocated Response Times

The TS require that licensees 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 the pressure or the level exceeds the setpoint for that variable and continues until the protective function is accomplished. For example, this response could be when a required pump is turned on, moves up to speed, and delivers the required flow. Another example of a response could be when a valve is fully open or closed. The CEOG request only justifies the elimination of the sensor RTT but 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 value must be used in lieu of an actual measured value to determine the overall protective system response time, this assumed valued is that time allocated to the response of the sensor. 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.

The sensors for which the manufacturer provided response time values were Rosemount and Barton pressure and differential pressure transmitters. The allocated response time values, as provided in Table 3.1 of NPSD-1167, are shown below:

Manufacturers' Response Time Specifications

Manufacturer	Model Number	Range Code	Description	Response Time Spec.
Rosemount	1152 (DP, HP, AP, GP)	3	Differential Pressure or Pressure Transmitter	0.3 sec.
Rosemount	1152 (DP, HP, AP, GP)	4,5	Differential Pressure or Pressure Transmitter	0.2 sec.
Rosemount	1152 (DP, HP, AP, GP)	6,7,8,9,0	Differential Pressure or Pressure Transmitter	0.1 sec.
Rosemount	1153 (D, H, A, G)	3	Differential Pressure or Pressure Transmitter	2.0 sec.
Rosemount	1153 (D, H, A, G)	4	Differential Pressure or Pressure Transmitter	0.5 sec.
Rosemount	1153 (D, H, A, G)	5,6,7,8,9	Differential Pressure or Pressure Transmitter	0.2 sec.
Rosemount	1154 (DP, HP, GP)	4	Differential Pressure or Pressure Transmitter	0.5 sec.
Rosemount	1154 (DP, HP, GP)	5,6,7,8,9,0	Differential Pressure or Pressure Transmitter	0.2 sec.
Rosemount	1154H (D, H, S)	4	Differential Pressure or Pressure Transmitter	0.5 sec.
Rosemount	1154H (D, H, S)	5,6,7,8,9	Differential Pressure or Pressure Transmitter	0.2 sec.
Barton	763	N/A	Pressure Transmitter	0.18 sec.
Barton	763A	N/A	Pressure Transmitter	0.18 sec.
Barton	764	N/A	Differential Pressure Transmitter	0.18 sec.

As these values are supplied by Rosemount and Barton, the original manufacturers of the sensors, they are acceptable for use as allocated response times.

The sensors for which no manufacturer response time values were available, the Weed and Foxboro sensors, will have allocated response time values based upon historic plant measured values. Since these values are plant-specific, the derivation of the values will be discussed in the plant-specific portion of this SE.

3.2 Plant-Specific Applications

Each of the nuclear power plants mentioned in CEOG Topical Report NPSD-1167 has slightly different instrumentation and, therefore, will have somewhat different applications of the topical report. In addition, some utilities have asked for relief from RTT for sensors on which no vendor response time values are available and, in one case, a sensor that is not covered by EPRI Topical Report NP-7243.

In each case, the request for relief from RTT will enable the utility to discontinue the testing of the response time of the sensors contained in the request and to add the allocated response time value to the measured response time values for the portion of the protective system still requiring RTT to determine the overall protective system response time. This change will require a TS change. This is addressed in Section 3.3, "Proposed Technical Specification Changes," of this SE.

This topical report only covers certain sensors when they are used in specific protective systems. If the licensee should at some time in the future replace the sensor discussed in NPSD-1167 with a new sensor of a different manufacturer or model not mentioned in the topical report or approved by this safety evaluation, the elimination of RTT for the new sensor has not been reviewed or approved, and, therefore, RTT for the new sensor must either be performed and the appropriate changes made to TS and plant procedures, or an additional request for RTT elimination must be submitted and approved. If, however, the replacement sensor is one for which RTT elimination has been approved, the licensee may modify the plant procedures, using an allocated response time based upon a vendor-supplied response time value, or upon historical data for that transmitter type and model. If historical data are used, an appropriate statistical methodology for determining the allocated response time can be found in NUREG-1475, Table T-1 1 b, "One sided tolerance limit factor for a normal distribution."

The actual values for the assumed response time, while discussed in this SE, will not be contained in TS, but in licensee-controlled documents and procedures. These values can, therefore, be changed based upon physical modifications to the sensors, or additional historic data on actual measured response time values. If the change is due to physical modifications to the sensors, the licensees must also revisit the FMEA upon which the elimination of RTT was based to ensure that assumptions and determinations made in that FMEA are still valid for the modified sensor.

3.2.1 Palo Verde Units 1, 2 and 3 (Arizona Public Service Company)

The three Palo Verde plants have one additional sensor for which RTT elimination is being requested: the Barton model 763A sensor. Section 3.2 of CEOG Topical Report NPSD-1167 makes the following statement:

> "One exception is the ITT Barton Model 763A transmitter used at Palo Verde." From ITT Barton Manual No. 83C3(A) Errata Sheet dated November 1986, 'the only difference in form, fit or function between the Model 763 and 763A are as follows:
>
> > The soldered "thin" link wire (302 SST, 0.007" diameter, .015 gm weight) between the beam and the bourdon tube's tab has been replaced in the Model 763A by a welded "thick" link wire (17-4 PH SST, .031" diameter, .055 gm weight); and
> >
> > The location of the insulating pads for the termination of the strain gage lead wire has been changed in the Model 763A from the beam to the clamp plate.'
>
> These changes do not effect the theory of operation of the transmitter and would not change the FMEA conclusions determined in the EPRI report performed for the Model 763. The sensing element and electronics of the Model 763A are the same as the Model 763."

The staff concurs that the differences between the Barton 763 and 763A will not affect the response time characteristics of the sensor, and the FMEA performed on the Barton 763 and the response time characteristics and allocated response time of 180 milliseconds are valid for both the Barton 763 and the Barton 763A.

All other sensors for which APS has requested elimination of RTT at Palo Verde Units 1, 2, and 3 have all been analyzed in EPRI Topical Report NP-7243 and, in each case, the response time values have been determined by the sensor manufacturer. The staff has reviewed these systems and applications in which these sensors are used and concurs these sensors and systems are appropriate for RTT elimination.

The specific sensors and systems for which RTT elimination was requested are contained in Table 3.2-1 of CEOG Topical Report NPSD-1167 and are as follows:

Palo Verde Units 1, 2 and 3 Transmitters

Function	Instrument	Make / Model	Allocated Response Time
RPS Transmitter	RCS Low Flow	Barton Model 764	.180 second
	Containment Pressure	Rosemount Model 1153 Range Code 5	.200 second
	SG Level	Barton Model 764	.180 second
	Pressurizer Pressure	Barton Model 763A	.180 second
	SPS - Pressurizer Over Pressure	Rosemount Model 1153 Range Code 9	.200 second
	SG Pressure (RPS & ASGT)	Barton Model 763	.180 second
ESAS & AFW Transmitter	Containment Pressure - High (SIAS/CIAS/MSIS)	Rosemount Model 1153 Range Code 5	.200 second
	Containment Pressure - High-High (CSAS)	Rosemount Model 1153 Range Code 6	.200 second
	SG Level (AFAS/MSIS)	Barton Model 764	.180 second
	SG Pressure (AFAS/MSIS)	Barton Model 763	.180 second
	RWT Level (RAS)	Rosemount Model 1153 Range Code 5	.200 second
	Pressurizer Pressure (SIAS/CIAS)	Barton Model 763A	.180 second

3.2.2 San Onofre Units 2 and 3 (Southern California Edison)

The San Onofre units, in some of the applications, use Foxboro and Weed sensors for which the manufacturer does not publish response time values. For those channels on which sensor response time tests have been eliminated, but for which system RTT is still required, an assumed administrative value for sensor response time is required. To determine the channel response time, the assumed administrative value, instead of measured values, will be added to the measured values of the remainder of the system to ensure that the channel is capable of responding within the time assumed in the accident analysis.

The topical report proposes using a response time value based upon actual values measured during past response time tests. The CEOG and SCE provided the historical data and calculations for these instruments. These data were evaluated to determine statistical mean and standard deviation of the previously measured response time values. An assumed administrative value was chosen that would be compatible with a one-sided statistical tolerance limit so that 95 percent of the reading would fall within the limits, with a 95 percent confidence level. The staff has determined that since this is an NRC-approved method for calculating setpoint values and this methodology is statistically valid for determining an upper bounding value, this methodology is an appropriate method for calculating an assumed response time based upon historical operating data.

These calculations can be performed in accordance with (IAW) the methodology shown in NUREG-1475, Table T-1 1 b, "One-sided tolerance limit factor for a normal distribution." Time values shown below are in seconds.

Sensor	Foxboro N-E11DM
Usage	Containment Pressure (High/High-High)
Mean	.193
Standard Deviation	.108
Sample Size	36
One sided tolerance limit factor (95/95 Multiplier IAW NUREG-1475)	2.158
One-sided tolerance limit (T_{upper})	.426
SCE San Onofre Assumed Value	.430

Sensor	Foxboro E13DM
Usage	RWT Level
Mean	.272
Standard Deviation	.140
Sample Size	20
One sided tolerance limit factor (95/95 Multiplier IAW NUREG-1475)	2.396
One-sided tolerance limit (T_{upper})	.607
SCE San Onofre Assumed Value	.610

Sensor	WEED N-E11GM
Usage	Pressurizer Pressure - High, and SG Pressure
Mean	.060
Standard Deviation	.035
Sample Size	55
One-sided tolerance limit factor (95/95 Multiplier IAW NUREG-1475)	2.044
One sided tolerance limit (T_{upper})	.130
SCE San Onofre Assumed Value	.135

Sensor	Weed / Foxboro N-E13DM
Usage	SG Level
Mean	.307
Standard Deviation	.098
Sample Size	38
One-sided tolerance limit factor (95/95 Multiplier IAW NUREG-1475)	2.142
One sided tolerance limit (T_{upper})	.517
SCE San Onofre Assumed Value	.520

In each case in which SCE has assigned an assumed value, that value is larger than the calculated one-sided tolerance limit. The assumed values are thus conservative and are therefore acceptable. The staff also concurs that the methodology used by the CEOG and SCE has statistical validity and is an acceptable methodology for determining an administrative value to be used in those cases in which the administrative response time value is determined by use of historical plant data of previous measurements of that sensor's response time values.

The sensors for which SCE has requested elimination of RTT at San Onofre Units 2 and 3 have all been analyzed in EPRI Topical Report NP-7243, and, except in the cases discussed above,

the response time values have been determined by the sensor manufacturer. The staff has reviewed these systems and the applications in which these sensors are used and concurs that these sensors and systems are appropriate for RTT elimination.

The specific sensors and systems for which RTT elimination was requested are contained in Table 3.2-2 of CEOG Topical Report NPSD-1167 and are as follows:

San Onofre Units 2 and 3 Transmitters

Function	Instrument	Make / Model	Allocated Response Time
PPS Transmitter	RCS Low Flow	Rosemount Model 1153 Range Code 6	.200 second
	Containment Pressure	Foxboro Model N-E11 DM	.430 second
	SG Level	Weed Model N-E13 DM	.520 second
	Pressurizer Pressure	Rosemount Model 1154, Range Code 9 Weed Model N-E11 GM	.200 second .135 second
	RWT Level	Foxboro Model E13 DM	.610 second
	SG Pressure (RPS and ASGT)	Weed Model N-E11 GM	.135 second

3.2.3 Calvert Cliffs Units 1 and 2 (Baltimore Gas & Electric)

Calvert Cliffs uses Rosemount sensors in all the systems for which elimination of RTT has been requested. Since the Rosemount transmitters have vendor-supplied response time values, no evaluation of past RTT values is required. The only variation is the Rosemount sensor utilized in the RCS flow loop. This sensor is a Rosemount 1152, with a variable damping option. This variable damping option makes the response time adjustable from 0.2 second to 1.67 seconds. The CEOG has stated that the sensor is supplied by Rosemount with the damping adjustment set to the minimum 0.2-second setting, and that this setting is left at the minimum setting of 0.2 second and is sealed. Therefore, the 0.2 second allocated response time is acceptable to the staff. In the plant-specific licensee submittal to eliminate RTT, the licensee should discuss the administrative method used to control the setting of variable damping adjustment for these sensors.

All other sensors for which BGE has requested elimination of RTT at Calvert Cliffs Units 1 and 2 have been analyzed in EPRI Topical Report NP-7243, and, in each case, the response time values have been determined by the sensor manufacturer. The staff has reviewed these systems and the applications in which these sensors are used and concurs that these sensors and systems are appropriate for RTT elimination.

The specific sensors and systems for which RTT elimination was requested are contained in Table 3.2-3 of CEOG Topical Report NPSD-1167 and are as follows:

Calvert Cliffs Units 1 and 2 Transmitters

Function	Instrument	Make / Model	Allocated Response Time
RPS Transmitter	RCS Low Flow	Rosemount Model 1152 Range Code 6	.100 second
	Containment Pressure	Rosemount Model 1153 Range Code 5	.200 second
	SG Level	Rosemount Model 1154 Range Code 4	.200 second
	Pressurizer Pressure	Rosemount Model 1154 Range Code 9	.200 second
	SG Pressure (RPS and ASGT)	Rosemount Model 1154 Range Code 9	.200 second
ESAS & AFW Transmitter	Containment Pressure (ESFAS)	Rosemount Model 1153 Range Code 5	.200 second
	SG Level (AFW)	Rosemount Model 1154 Range Code 5	.200 second
	W. Pen. Rm. Letdown Isolation	Rosemount Model 1154 Range Code 4	.500 second
	SG Pressure (ESFAS, AFW)	Rosemount Model 1154 Range Code 9	.200 second
	Pressurizer Pressure (ESFAS)	Rosemount Model 1154 Range Code 9	.200 second

3.2.4 Waterford, Unit 3 (Entergy)

The sensors for which Entergy has requested elimination of RTT at Waterford Unit 3 have all been analyzed in EPRI Topical Report NP-7243, and in each case, the response time values have been determined by the sensor manufacturer. The staff has reviewed these systems and the applications in which these sensors are used, and concurs that these sensors and systems are appropriate for RTT elimination.

The specific sensors and systems for which RTT elimination was requested are contained in Table 3.2-4 of CEOG Topical Report NPSD-1167, and are as follows:

Waterford Unit 3 Transmitters

Function	Instrument	Make / Model	Allocated Response Time
PPS Transmitter	RCS Low Flow	Barton Model 764	.180 second
	Containment Pressure	Rosemount Model 1153 Range Code 6	.200 second
	SG Level	Rosemount Model 1154 Range Code 4	.500 second
	RWT Level	Rosemount Model 1152 Range Code 5	.200 second
	Pressurizer Pressure	Rosemount Model 1154 Range Code 9	.200 second
	SG Pressure	Rosemount Model 1154 Range Code 9	.200 second

3.2.5 St. Lucie Units 1 and 2 (Florida Power & Light)

The sensors for which FPL has requested elimination of RTT at St. Lucie Units 1 and 2 have all been analyzed in EPRI Topical Report NP-7243, and, in each case, the response time values have been determined by the sensor manufacturer. The staff has reviewed these systems and the applications in which these sensors are used and concurs that these sensors and systems are appropriate for RTT elimination.

The specific sensors and systems for which RTT elimination was requested are contained in Table 3.2-5 of CEOG Topical Report NPSD-1167 and are as follows:

St. Lucie Unit 1 Transmitters

Function	Instrument	Make / Model	Allocated Response Time
RPS Transmitter	Containment Pressure	Rosemount Model 1153 Range Code 6	.200 second
	SG Level	Rosemount Model 1154 Range Code 4	.500 second
	Pressurizer Pressure	Rosemount Model 1154 Range Code 9	.200 second
	SG Pressure	Rosemount Model 1153 Range Code 9	.200 second
ESAS & AFW Transmitter	Containment Pressure (ESFAS)	Rosemount Model 1153 Range Code 6	.200 second
	SG Level	Rosemount Model 1154 Range Code 4	.500 second
	SG Pressure	Rosemount Model 1153 Range Code 9	.200 second
	RWT Level	Rosemount Model 1153 Range Code 5	.200 second
	Pressurizer Pressure	Rosemount Model 1154 Range Code 9	.200 second

St. Lucie Unit 2 Transmitters

Function	Instrument	Make / Model	Allocated Response Time
RPS Transmitter	RCS Low Flow	Rosemount Model 1154 Range Code 6	.200 second
	Containment Pressure	Rosemount Model 1153 Range Code 6	.200 second
	SG Level	Rosemount Model 1154 Range Code 4	.500 second
	Pressurizer Pressure	Rosemount Model 1154 Range Code 9	.200 second
	SG Pressure	Rosemount Model 1153 Range Code 9	.200 second
ESAS & AFW Transmitter	Containment Pressure (ESFAS)	Rosemount Model 1153 Range Code 6	.200 second
	SG Level	Rosemount Model 1154 Range Code 4	.500 second
	SG Pressure	Rosemount Model 1154 Range Code 9	.200 second
	RWT Level	Rosemount Model 1153 Range Code 5	.200 second
	Pressurizer Pressure	Rosemount Model 1154 Range Code 9	.200 second

3.2.6 Arkansas Nuclear One, Unit 2 (Entergy)

The sensors for which Entergy has requested elimination of RTT at Arkansas Nuclear One, Unit 1, have all been analyzed in EPRI Topical Report NP-7243, and, in each case, the response time values have been determined by the sensor manufacturer. The staff has reviewed these systems and the applications in which these sensors are used, and concurs that these sensors and systems are appropriate for RTT elimination.

The specific sensors and systems for which RTT elimination was requested are contained in Table 3.2-6 of CEOG Topical Report NPSD-1167 and are as follows:

Arkansas Nuclear One - Unit 2 Transmitters

Function	Instrument	Make / Model	Allocated Response Time
RPS Transmitter	Containment Pressure	Rosemount Model 1153 Range Code 6	.200 second
	SG Level	Rosemount Model 1154 Range Code 65	.200 second
	Pressurizer Pressure (High)	Rosemount Model 1154 Range Code 4	.500 second
	Pressurizer Pressure (Low)	Rosemount Model 1154 Range Code 9	.200 second
	SG Pressure	Rosemount Model 1154 Range Code 6	.200 second
ESFAS Transmitter	Containment Pressure	Rosemount Model 1153 Range Code 5	.200 second
	SG Level	Rosemount Model 1154 Range Code 4	.500 second
	SG Pressure & D/P	Rosemount Model 1154 Range Code 9	.200 second
	RWT Level	Rosemount Model 1154 Range Code 5	.200 second
	Pressurizer Pressure	Rosemount Model 1153 Range Code 9	.200 second

3.3 Proposed Technical Specification Changes

The elimination of RTT will require a change to the TS to remove the requirement to perform RTT of sensors and systems specified in CE Topical Report NPSD-1167, Revision 2. Proposed changes to the CE Standard Technical Specifications (STS) were included in the topical report as Appendix A. The procedure to change the STS is to submit proposed STS modifications to the Nuclear Energy Institute (NEI) Technical Specifications Task Force (TSTF). The changes are reviewed by TSTF for consistency in STS usage and convention, as well as technical accuracy, and are then submitted to the NRC Technical Specifications Branch for review and approval. Since the STS changes were not submitted via the NEI TSTF, the proposed changes in Appendix A are not approved.

3.4 Changes to Licensee's Plant-Specific Procedures

In some instances, the performance of RTT on the RPS and ESFAS functions measures the response time from the input of the sensor to the tripping of the associated relay. In these instances, the licensee must, therefore, revise its test procedures to delete the response time testing of the sensors and measure the remainder of the RPS and the ESFAS loops. The allocated response time will then be added to the measured response time for the remainder of the RPS or the ESFAS protection loop and will be verified to meet the assumptions of the safety analysis. This modification of plant procedures should be discussed in the plant-specific licensing action request submitted to eliminate RTT in accordance with CEOG NPSD-1167 and this SE.

3.5 EPRI Recommendations

EPRI Topical Report NP-7243, Rev. 01, is the report upon which the CEOG based its Topical Report NPSD-1167 for elimination of RTT. This EPRI topical report includes several recommendations for actions to ensure sensors are operating correctly and that calibration or other surveillance 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 wishing to eliminate sensor RTT should incorporate the recommended actions into their revised RTT program. The recommendations of EPRI NP-7243 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.

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.

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.

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.

The staff concurs with these recommendations. Therefore, licensees using EPRI NP-7243, CEOG NPSD-1167, and this SE for the elimination of RTT should address the recommendations, show the applicability to their plant and discuss how these recommendations are being incorporated into plant procedures.

4.0 CONCLUSION

On the basis of our review of the information presented by the CEOG in Topical Report CE NPSD-1167, Revision 2, as modified by letter CEOG-00-171, dated June 6, 2000, the staff agrees with the CEOG's conclusion that for the sensors and systems specified in NPSD-1167, Revision 2, response time testing is not required to demonstrate satisfactory sensor performance and that other routine surveillance, such as calibrations and drift monitoring, is sufficient to demonstrate satisfactory sensor performance, and therefore Revision 2 to CE NPSD-1167, as modified by letter CEOG-00-171, is acceptable as a basis for eliminating RTT from TS for the sensors and systems identified in the report. The proposed STS changes shown in Appendix A are not approved, and will be submitted to NEI TSTF for review and concurrence prior to submittal to the NRC staff.

Principal Contributor: P. Loeser

Date: July 24, 2000