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2CAN029701

U. S. Nuclear Regulatory Commission
Document Control Desk
Mail Station P1-137
Washington, DC 20555

Subject: Request For Additional Information Regarding Technical Specification Change On The Extension Of The PPS Surveillance Test Interval To 123 Days

Gentlemen:

By letter dated October 7, 1996, (2CAN109603), Entergy Operations submitted a request to change the Arkansas Nuclear One - Unit 2 (ANO-2) Technical Specifications. The proposed amendment changes the channel functional testing frequency for most of the Reactor Protection System (RPS) and Engineered Safety Feature Actuation System (ESFAS) instrumentation from monthly to every four months. As stated in the previous letter (2CAN109603), the basis for this change comes from CEN-327 and CEN-327 Supplement 1, "RPS/ESFAS Extended Test Interval Evaluation" and CE NPSD-576, "RPS/ESFAS Extended Test Interval Evaluation for 120 Day Staggered Testing" and ANO calculation 92-E-0084-01, "Plant Protection System Bistable Drift Analysis". Since CE NPSD-576 has not been submitted to the NRC, we are withdrawing all references to it and its 120 day frequency as a basis for this amendment request and replacing it with Attachment 1 to this letter. The basis information contained in CE NPSD-576 that is relevant to ANO-2 for this amendment request has been included as Attachment 1 to this letter.

Should you have any questions regarding this submittal, please contact me or a member of my staff.

Very truly yours,

Dwight C. Mims

Dwight C. Mims
Director, Nuclear Safety

DCM/rdc

Attachment

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ATTACHMENT 1

ANO-2 PPS SURVEILLANCE INTERVAL EXTENSION ADDITIONAL BASIS

2CAN029701

IN THE MATTER OF AMENDING

LICENSE No. NPF-6

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT TWO

DOCKET No. 50-368

1.0 BACKGROUND

This attachment addresses the impact on RPS and ESFAS system reliabilities resulting from extending the surveillance test intervals from monthly sequential testing to triannual staggered testing. Triannual is derived from the frequency of every 4 months or three times a year. 123 days was derived from adding up the total number of days from the longest four sequential calendar months. This methodology is consistent with our current and the revised standard Technical Specifications.

The results included in this attachment are compared with those presented in CEN-327-A and its supplement. The system unavailabilities were evaluated for the RPS on a trip-parameter-by-trip parameter basis, and for the ESFAS on a signal-by-signal basis.

2.0 METHODOLOGY

The information contained in this attachment is derived from a re-evaluation of the RPS and ESFAS fault tree models developed for and presented in CEN-327-A. The system descriptions for the RPS and ESFAS are presented in sections 2.1 and 2.2 of CEN-327-A, respectively. The fault tree modeling methodology is described in section 3 of CEN-327-A. The data analysis methodology and the RPS and ESFAS reliability data is presented in Appendix AE of CEN-327-A. Appendices A, B, and C of CEN-327-A present the graphical fault tree models for the RPS and Appendices D through AD of CEN-327-A present the graphical fault tree models for the ESFAS.

2.1 RPS METHODOLOGY

CE has supplied the RPS for ANO-2 and all the plants with a CE NSSS. ANO-2 was supplied with one of the four basic CE designs for the RPS. For CEN-327-A, CE constructed four RPS fault tree models, one for each of the CE RPS designs. These models were constructed such that the components associated with the trip parameters were developed as separable subtrees. Thus, it was possible to analyze the ANO-2 RPS design on a trip parameter-by trip parameter basis simply by connecting the appropriate subtrees to the main RPS trees. A total of forty-four (44) trip parameters for the four RPS designs were analyzed in CEN-327-A and its supplement.

The same methodology used in CEN-327-A and its supplement for the RPS designs is employed in this analysis. However, this analysis evaluates the impact of extending the surveillance intervals from monthly sequential to triannual staggered testing.

2.2 ESFAS METHODOLOGY

The following actuation signals are generated by the ESFAS when the monitored variable reaches the levels that are indicative of conditions which require protective actions:

- Safety Injection Actuation Signal (SIAS)
- Containment Isolation Actuation Signal (CIAS)
- Containment Spray Actuation Signal (CSAS)
- Main Steam Isolation Signal (MSIS)
- Recirculation Actuation Signal (RAS)
- Emergency Feedwater Actuation Signal (EFAS).

A fault tree model was constructed for each of these signals for ANO-2. In some cases certain models could be used for more than one ESFAS signal or plant. A total of twenty-six (26) fault tree models were constructed to evaluate the ESFAS signals for all the CE plants.

The same methodology used in CEN-327-A and its supplement for the ESFAS designs is employed in this analysis. However, this analysis evaluates the impact of extending the surveillance intervals from monthly sequential to triannual staggered testing.

2.3 FAULT TREE EVALUATION

The RPS and ESFAS fault trees developed for CEN-327-A were originally evaluated using the SETS code for cutset generation and the KITT code for quantification. For this analysis, Version 2.0 of the IRRAS code was used for both cutset generation and quantification. The original SETS RPS and ESFAS fault tree model input decks were loaded into IRRAS via its SETS interface. These models were then evaluated and quantified using component failure rates based on a monthly test interval. The results of these quantifications were compared to the equivalent results contained in CEN-327-A to verify that they were the same. Next, the failure rates for the bistables, the bistable relays, the logic matrix relays and the K relays were changed to reflect a staggered test interval of every four months or triannual frequency and the fault trees were requantified to determine the system reliability for the triannual staggered test interval.

3.0 RESULTS

The fault tree analysis results for the RPS and ESFAS are presented as system unavailabilities. The RPS unavailability is the probability that the RPS is unavailable to perform its function of tripping the reactor when required. Likewise, the ESFAS unavailability is the probability that the ESFAS fails to activate specific ESF System components. The fault tree analyses results for the RPS and ESFAS are discussed in Sections 3.1 and 3.2 respectively.

Table 3.1-1 presents the RPS unavailabilities for ANO-2 on a trip parameter basis. Table 3.2-1 presents the ESFAS unavailabilities for ANO-2 for the ESFAS signals.

3.1 RPS FAULT TREE ANALYSIS RESULTS

As presented in Table 3.1-1 the RPS unavailability changes no more than 4% when the test intervals for the bistables, bistable relays, calculational modules, logic matrix relays, K relays, and the manual trip actuation devices are extended from monthly sequential testing to triannual staggered testing.

More importantly, in each case the percent change in RPS unavailabilities that results from extending the surveillance test interval from monthly sequential testing to triannual staggered testing is less than the extended surveillance interval addressed in CEN-327-A and its supplement. The percent change for ANO-2, on a parameter-by-parameter basis, is shown in Table 3.1-1. The RPS unavailabilities for the triannual staggered testing should be acceptable as they are lower than the RPS unavailablilties for a quarterly test interval with sequential testing which have been found to be acceptable by the NRC in CEN-327-A.

3.2 ESFAS FAULT TREE ANALYSIS RESULTS

As shown in Table 3.2-1 , the change in ESFAS unavailabilities that results from extending the surveillance test interval from monthly sequential testing to triannual staggered testing are all less than the change in ESFAS plant unavailabilities that results from extending the test interval from monthly to quarterly sequential testing.

4.0 CONCLUSIONS

The results of this analysis demonstrate that extending the surveillance test interval for the RPS from monthly sequential testing to triannual staggered testing results in lower RPS unavailabilities as compared to the results from extending the test interval from monthly to quarterly sequential testing.

The unavailabilities for the triannual staggered test interval scheme meets the criteria for acceptance in that the NRC has already accepted the higher unavailabilites for the quarterly sequential test interval in CEN-327-A.

Similarly, when the surveillance test interval scheme for the ESFAS is extended from monthly sequential testing to triannual staggered testing, the ESFAS plant unavailabilities decrease when compared to the results from extending the test interval from monthly to quarterly sequential testing.

TABLE 3.1-1

RPS SYSTEM UNAVAILABILITIES FOR THE RPS

Trip Parameter	Unavailability (Monthly Seq. Test Interval)	Unavailability (Quarterly Seq. Test Interval)	Unavailability (Triannual Stag. Test Interval)	% Change (Quarterly)	% Change (Triannual Stag.)
High CNTMT Pressure	3.45E-6	3.66E-6	3.60E-6	6%	4%
High Pzr Pressure	3.34E-6	3.40E-6	3.36E-6	2%	1%
High Power Level	3.31E-6	3.36E-6	3.34E-6	2%	1%
Low S/G Pressure	3.26E-6	3.32E-6	3.29E-6	2%	1%
Low S/G Level	3.29E-6	3.35E-6	3.32E-6	2%	1%
High LPD	3.32E-6	3.39E-6	3.35E-6	2%	1%
High S/G Level	3.43E-6	3.60E-6	3.57E-6	5%	4%
High Log Power	3.41E-6	3.50E-6	3.43E-6	3%	1%
Low Pzr Pressure	3.30E-6	3.36E-6	3.32E-6	2%	1%
Low DNBR	3.32E-6	3.39E-6	3.35E-6	2%	1%

TABLE 3.2-1

ESFAS FAILURE PROBABILITIES FOR ANO-2

ESFAS SIGNALS	Unavailability (Monthly Seq. Test Interval)	Unavailability (Quarterly Seq. Test Interval)	Unavailability (Triannual Stag. Test Interval)	% Change (Quarterly)	% Change (Triannual Stag.)
SIAS	1.47E-4	1.52E-4	1.50E-4	3%	2%
CIAS	1.47E-4	1.52E-4	1.50E-4	3%	2%
CSAS	1.67E-4	1.72E-4	1.69E-4	3%	1%
MSIS	1.47E-4	1.52E-4	1.50E-4	3%	2%
RAS	2.93E-3	3.02E-3	2.98E-3	3%	2%
EFAS	1.54E-4	1.59E-4	1.57E-4	3%	2%