June 28, 1996

Dr. Robert C. Mecredy
Vice President, Nuclear Operations
Rochester Gas and Electric Corporation
89 East Avenue
Rochester, NY 14649

SUBJECT: WESTINGHOUSE OWNERS GROUP - REQUEST FOR ADDITIONAL INFORMATION ON WCAP-14333P, "PROBABILISTIC RISK ANALYSIS OF THE RPS AND ESFAS TEST TIMES AND COMPLETIONS" (TAC NO. M92782)

Dear Dr. Mecredy:

By letter dated June 20, 1995, you submitted WCAP-14333P for review. Also, by letter dated June 20, 1995, the Westinghouse Owners Group (WOG) provided the same report to the NRC for review and approval. Since the Ginna Plant is the lead plant for the issue addressed by this report, we are addressing the enclosed Request for Additional Information (RAI) to you for your disposition. Please provide us your schedule for responding to the RAI within 30 days from receipt of this letter.

Sincerely,
/S/
Guy S. Vissing, Senior Project Manager
Project Directorate I-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket No. 50-244

Enclosure: Request for Additional Information

cc w/encls: See next page

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NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

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Request for Additional Information on the Review of WCAP-14333P, "Probabilistic Risk Analysis of the Reactor Protection System (RPS) and Engineered Safety Features Actuation System (ESFAS) Test Times and Completion Times"

Benefit of the Requested Changes

1. A number of TS changes to the RPS and ESFAS system of W-designed pressurized water reactors (PWRs) have previously been approved by the NRC which have been in effect at a number of plants over a period of time. An analysis of the effectiveness of these changes, particularly in relation to the benefits of the changes being suggested at this time, may form a partial basis for justifying the changes requested. Specifically, discuss the following with quantitative data, as applicable and available:

   a. Longer Allowed Outage Times (AOTs) promote improved maintenance, improved system reliability, reduced number of spurious reactor trips and spurious actuation of safety equipment, (item 1 in Section 9.0).

   b. Longer AOTs will provide plant operators additional flexibility in operating the plant which will facilitate prioritizing component repairs (item 3 in Section 9.0).

   c. Extending AOTs results in fewer discretionary enforcements relating to inadequate time to complete repair activities (item 5 in Section 9.0).

   d. Increased test bypass time allows for improvements in conducting the test, reducing test-caused transients.

Survey Data on Test and Maintenance Times

2. The following additional explanations relating to the plant survey summary, as presented in Tables 4.1-4.6, should be helpful in understanding the needs/reasons for the requested AOT and test, or bypass, time changes.

   a. Why are there such differences in test and maintenance times considering the strong similarities in RPS and ESFAS systems? Do plants of older vintage require longer times?

   b. The maximum times are longer than the currently allowed TS limits. Does that imply that plants do expect to cross the limits set in the TS? What actions are taken in those situations?

   c. Why is "no impact" expected in test and maintenance (T/M) times due to the requested extension when it is stated that the reasons for these extensions are to conduct T/M with caution to avoid any unwarranted effects, and to improve the quality of such activities which will improve the component performance?

ENCLOSURE

d. A significant number of trips that have occurred are related to test and maintenance activities (>20%). What analyses have been done of T/M practices to understand the reason for such occurrences, and what measures are being taken, besides the request for the changes, to reduce such trips?

3. The analysis is based on the results of a survey of 24 units of Westinghouse plants. The IPE submittals show that there are 51 units of Westinghouse plants (6 units of the 2-loop plants, 13 of the 3-loop plants and 32 of the 4-loop plants). Since the survey only represents 49% of the Westinghouse plants, can the results be generalized to all Westinghouse plants?

Maintenance Frequencies and Duration

4. The maintenance intervals for master and slave relays are stated to be based on the component's failure rate. The failure rate given in the report is 5.29E-7/hour, which implies 215 years per failure. At the same time, the submittal states that the survey results indicate maintenance about every 30 months (assuming a test interval of 3 months). This is typical of many components where corrective maintenance is done more frequently when compared to failure occurrences. Please explain the maintenance interval used and any contradiction between the interval used and the survey results.

Use of Representative Actuation Signals

5. Representative emergency safety features actuation and reactor trip actuation signals were evaluated in the submittal and the results of other signals were assumed to lie between the bounding cases presented. In calculating the core damage frequency, what values were used for the other signals?

RPS and ESFAS Signal Unavailability Analysis

6. The fault trees used are based on those previously developed for Westinghouse Owners Group (WOG) Technical Specification Optimization Program (TOP). Most of the fault trees came directly from previous submittals. This assumes that there are basically no changes in the solid state protection systems being implemented at these plants. Please comment on this assumption. Also, discuss the data sources used to define the input data for quantification of these fault trees. Emphasize discussions relating to the use of nuclear power plant experience data base for the components in these systems.

7. Please discuss the data sources used to estimate common cause failure (CCF) probabilities. Please discuss the differences in CCF probability contribution for relay protection and solid state protection systems.

8. The results of signal unavailabilities presented in Table 7.1 to 7.4 show that unavailability associated with Solid State Protection System (SSPS) is consistently lower than the relay protection system. It is generally believed that solid state systems are reliable compared to analog systems. Please comment on this.

Risk Analysis

9. Vogtle plant PRA model is used for the risk analysis to represent the risk impact of the proposed changes for the W plants. Please comment on the quality, scope, and level of detail of the Vogtle plant PRA focussing on the aspects relevant to RPS and ESFAS TS change analyses. Also, Vogtle plant being a 4-loop plant, please discuss the differences in similar risk calculations for 3-loop and 2-loop plants and why analysis of a 4-loop plant is adequate to justify changes for 3-loop and 2-loop plants.

10. Please provide the steps followed in obtaining the CDF impact (i.e., increase in the average CDF) for the AOT and test bypass time changes in RPS and ESFAS starting from the changes in the representative signal unavailability for the Vogtle plant. Consider 2/4 logic with all the proposed changes as an example case to explain the steps and present intermediate results to a reasonable extent.

11. Please provide the T/M configurations and the conditional CDF for each of the LCOs for which changes are being requested. For each of the T/M conditions defined in Table 5.1 for which changes are proposed, define which part of the system is disabled, if any, and quantify the CDF for the condition.

12. The submittal states that the difference in the results between the TOP analysis in WCAP-10271, and the current analysis, can be attributed to two primary analysis differences: realistic assumptions on maintenance intervals, and crediting AMSAC to start auxiliary feedwater pumps. Please provide the following details with respect to these modeling differences:

    a. To calculate the impact of the request changes on the average CDF, a base case with the same modeling assumptions should be developed. Please provide the base case with the existing requirements for RPS and ESFAS, and the changed CDF with the proposed changes, under the same assumptions as discussed above.

    b. Please provide details of how AMSAC was credited. Also, present a brief summary of TS requirements for this system, if applicable, and the T/M practices followed. If available, provide any fault tree analysis of the system.

13. In the submittal, evaluations up to Level 1 PRA, i.e., CDF calculations, were presented. This may not represent the impact of all changes to ESFASs. For example, the containment isolation signal is not expected to have any impact on CDF, but can considerably affect the release of radionuclides. The main feedwater isolation and steamline isolation signals will also affect the direct release of radionuclides, besides CDF. Please explain how these signals were handled in the evaluations and also, present an assessment of the impact of the change on PRA Level 2 measures.

14. The risk evaluation of the RPS and ESFAS test time and completion time changes contains a number of assumptions. This is not unusual in risk-based evaluations, but use of sensitivity analysis is appropriate to address the impact of these assumptions. The submittal presents sensitivity analyses with respect to crediting reduction in transient frequency and system importance rankings. Please present sensitivity analyses for the following issues:

    a. Uncertainty in human error probabilities for operator actions backing up actuation signals,

    b. Variation in maintenance frequency of the master and slave relays,

    c. Uncertainty in the CCF probability estimates used in system unavailability models, and

    d. Assumptions regarding AMSAC availability.

15. In Section 6.1, the containment spray and containment phase B isolation signals are represented by the safety injection signal, because they all have two master relays per train with each master actuating three slave relays. However, WCAP-10271, Supplement 2, Revision 1 (March, 1987), shows that each containment spray and isolation signals have one master relay which actuates two slave relays. Please clarify the difference.

16. The Vogtle Electric Generating Plant (VEGP) is selected to represent all Westinghouse plants and the VEGP IPE is used to estimate the risks expressed in terms of total CDF from all accident classes. Since the analysis is performed for the safety injection system, the unavailability of the system primarily affects the Loss-of-Coolant Accident (LOCA) class, and its impact is reflected on the change of CDF of the LOCA class. It is not, however, clear whether only the impact on LOCA is used to estimate the impact on total CDF. The impact on CDF is underestimated if the contribution of LOCA CDF to the total CDF is relatively small. Using the IPE Data Base developed at BNL, a comparison of several Westinghouse plants was made as shown below:

Plant	Percent of Core Damage Frequency Per Accident Class						
	SBO	ATWS	Transients	LOCA	SGTR	ISLOCA	Int. Flood
Vogtle 1/2	61	0	16	19	4	0	0
D.C. Cook 1/2	2	5	26	56	11	0	0
Shearon Harris 1	24	7	16	43	3	1	7
Zion 1/2	11	0	13	45	30	0	0
McGuire 1/2	23	4	33	38	0	0	0
Watts Bar 1	22	5	27	30	5	0	11

The Vogtle LOCA class contributes 19% to the total CDF. A 10% increase of the LOCA CDF causes only a 2% increase of the total CDF. The same 10% increase of LOCA CDF causes a 5.6% increase of the total CDF for the D.C. Cook plants. Please comment on the aspects discussed here.

17. Please discuss the engineering and deterministic considerations in deciding the requested test and completion time changes for RPS and ESFAS.

18. In reviewing risk-based TS modifications and associated amendments, the NRC staff uses an approach that consists of the following three areas:

    In the first area, the staff expects the licensee to determine the change in plant operational risk (specifically, the change in core damage frequency (CDF) and core damage probability (CDP)) as a result of the proposed TS modification and discuss its significance. In addition, in order to better understand the impact of the amendment on containment performance, the staff expects the licensee to perform an analysis of the large early release frequency (LERF) under the modified TS conditions and discuss the results or, if applicable, an analysis of offsite consequences.

In the second area, it is intended for the licensee to provide reasonable assurance that risk-significant plant equipment outage configurations will not occur while the plant is subject to the Limiting Condition for Operation (LCO) proposed for modification.

The purpose of the third area is to assure that, before performing maintenance activities including removal of any equipment from service, the licensee performs a thorough assessment of the overall impact on safety functions of related TS activities, as required by the proposed Maintenance Rule. This should be an intrinsic part of all maintenance scheduling.

The issues relating to the first area are addressed in other questions presented earlier.

a. (Second area) Given the proposed T/M plant configuration, what are the other risk-significant systems or equipment? Please discuss the analyses performed to identify risk-significant configurations for which changes are proposed and the procedures followed, or will be followed, to avoid/restrict such occurrences.

b. (Third area) Explain how you are going to address the issue of configuration and control, consistent with the Maintenance Rule, i.e., evaluate the impact of maintenance activities on plant configurations. Please discuss the programs for configuration management in Westinghouse plants to address assessment of risk impacts prior to entry into the RPS and ESFAS bypass time or AOT, being proposed for extension.