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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

Subject: Catawba Nuclear Station, Units 1 and 2
Docket Nos. 50-413 and 50-414
Deletion of the Boronometer as a Method for
Meeting a Regulatory Guide 1.97 Commitment

Gentlemen:

On December 17, 1982, Generic Letter 82-33 (Supplement 1 to NUREG-0737) was issued by the NRC. This letter included additional clarification regarding Regulatory Guide 1.97, Revision 2. Duke Power Company responded to the Regulatory Guide 1.97 portion of the Generic Letter on September 26, 1983. Additional information was submitted on October 22, 1985 concerning exceptions to and deviations from the regulatory guide. In Supplement 5 to the Catawba Safety Evaluation Report (Appendix L), the NRC concluded that Duke had provided an explicit commitment on conformance to Regulatory Guide 1.97, and that Duke had either conformed to or was justified in deviating from the regulatory guide with one exception. The one exception was the Cold Leg Accumulator tank level and pressure instrumentation.

One of the regulatory guide variables that pertains to PWRs is "RCS Soluble Boron Concentration". This Type B variable is intended to provide post-accident information to indicate whether the plant safety function of reactivity control is being accomplished. Catawba's commitment relative to this variable was to utilize the installed Boronometer which had a different range than that required by the regulatory guide, but was considered adequate for the anticipated concentrations of boron. Sampling and analysis was stated to be the backup source of information on the reactor coolant soluble boron concentration.

Catawba Nuclear Station is planning on permanently removing the boronometers on both Units from service. The Station is currently utilizing the Post-Accident Sampling System capability for sampling and analysis of the reactor coolant system to satisfy the regulatory guide requirement for verifying boron concentration. Additionally, twice-daily sampling of the reactor coolant system is currently being performed.

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Twice-daily sampling of the reactor coolant system has proven to be the most reliable method for obtaining boron concentration at Catawba. Sampling and chemical analyses is also considered as the most desirable method for the station to meet the Regulatory Guide 1.97 recommendations. The attached document provides the basis for changing this commitment. An evaluation has been performed to assess the affect on plant safety if the boronometers were permanently removed from service, and there is no adverse impact on nuclear safety associated with such a deletion. This was the expected conclusion since the NRC has accepted that sampling and laboratory analysis satisfy the intended monitoring function for this variable at other nuclear stations.

This issue has been discussed in the past with the Catawba NRC Resident Inspectors and the NRC Staff. The NRC Staff requested that they be allowed to approve any changes in the Regulatory Guide 1.97 commitments because they serve as part of the licensing bases of the station. I do not believe deletion of the boronometer and implementation of twice-daily sampling is a change to Duke's intent of meeting the regulatory guide requirements. Only the manner in how the station accomplishes verification of soluble boron concentration is being altered. Therefore, I believe this particular commitment change falls under the purview of 10 CFR 50.59. However, due to the sensitivity of the post-TMI issues, and in consideration of the NRC's request, this letter provides detailed information of this intended change.

Very truly yours,

Hal B. Tucker

RGM/10239001

Attachment

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Catawba Nuclear Station

Revision Of Regulatory Guide 1.97 Commitment
Monitoring Reactor Coolant System Soluble Boron Concentration

Catawba Nuclear Station is planning to permanently take the boronometers on Units 1 and 2 out of service. The boronometer is described in Table 1.9-7 of the FSAR. This table provides a listing of the Regulatory Guide 1.97, Revision 2 variables and Catawba's conformance or exception to them. On page 13 of this table (Attachment I), the boronometer is described as the installed instrumentation used to monitor reactor coolant soluble boron concentration. Sampling and analysis is stated to be the backup source of information on this variable. The following paragraphs discuss the basis behind the station's decision to utilize sampling and analysis as the primary source of information for meeting the regulatory guide recommendation. Attachment II is the proposed FSAR Table 1.9-7 revision as it will appear in the 1990 update of the FSAR.

Background

The Unit 1 boronometer at Catawba experienced numerous problems during the initial start-up of the Unit. These problems resulted in a relatively poor calibration accuracy on the equipment as well as the need for frequent calibrations. The boronometer became a high maintenance item as a result. During this startup period, twice-daily sampling of the reactor coolant system was initiated as an interim compensatory measure for monitoring soluble boron concentration. This was discussed with the NRC Resident Inspector at the time and was deemed to be appropriate. The station has reviewed the status of the boronometers and concluded that the modifications and maintenance necessary for the existing boronometers to provide a reliable indication is not cost effective. It has also been concluded that the boronometer is not the optimum choice for meeting the Regulatory Guide 1.97 recommendations.

Criteria For Selection of RG 1.97 Type A, B, and C Variables

As stated in Duke Power's response to NUREG 0737, Supplement 1, the Station Emergency Procedures and the Safety Parameter Display System (SPDS) Critical Safety Functions were key factors to be considered when the Regulatory Guide 1.97 variables were selected. The Emergency Procedures provided the primary guidance for selection of the Type A variables. The SPDS Critical Safety Function (CSF) Status Trees formed the basis for selection of the Type B and C variables.

For the "Subcriticality" Critical Safety Function, Catawba's SPDS monitors neutron flux and Control Rod position to ensure the CSF is satisfied. The Regulatory Guide 1.97, Rev. 2 guidance identifies neutron flux as the key Type B variable to monitor, with Control Rod Position as a secondary variable. Reactor coolant soluble boron concentration is not an SPDS variable at Catawba. The primary reason the boronometer is not suitable as an input to the SPDS is that during an accident (ESF actuation) the

normal letdown lines from the reactor coolant system automatically isolate. The boronometer monitors the coolant in the letdown line and so it too becomes isolated from the reactor coolant system.

Because the boronometer is not referenced in any Emergency Procedure or Abnormal Operating Procedure and is not utilized as an input to the SPDS, it does not meet Duke Power's criteria as a Type A, B or C Regulatory Guide 1.97 variable.

Assessment of Plant Conditions During and Following an Accident

As discussed above, the boronometer is isolated from the reactor coolant system at the onset of an accident when the Engineered Safety Features actuate. The boronometer is therefore incompatible with the intent of Regulatory Guide 1.97 which addresses accident and post-accident requirements. However, the use of the Post-Accident Sampling System to obtain a sample of primary coolant and subsequent chemical analyses is the appropriate method to determine soluble boron concentration during and following an accident.

The Catawba Post-accident Sampling System meets all the criteria of Item II.B.3 in NUREG-0737 and has been found acceptable by the NRC (NUREG-0954, Supplement 3, dated July 1984).

Recommended Range

The range of concentrations that laboratory analysis can determine reactor coolant soluble boron concentration is better than that associated with the boronometer. Regulatory Guide 1.97 recommends a range of 0 to 6000 PPM for this variable. The Catawba boronometer has a total range of 0 - 5000 PPM and, therefore, deviated from the regulatory guide. The NRC Staff stated in the SER that this deviation went beyond the scope of the RG 1.97 conformance review and would be addressed as part of the NRC's review of NUREG-0737, Item II.B.3, Post-Accident Sampling System. The NRC concluded that the Catawba Post-Accident Sampling System met all the criteria of Item II.B.3 in NUREG-0737 and was found acceptable by the NRC (NUREG-0954, Supplement 3, dated July 1984). The Post Accident Sampling System at Catawba as described in the FSAR and the NRC SER does not utilize the boronometer. However, the method of sampling and analyses for boron was found to be satisfactory. The range of concentrations over which the laboratory analysis can be performed is 0 - 8000 PPM.

Accuracy of Indication

As discussed below, the accuracy of laboratory analyses to determine reactor coolant soluble boron concentration is better than that associated with the boronometer, therefore, it meets the Regulatory Guide 1.97 requirement.

The boronometer calibration method consists of mixing various concentrations from 0 to 2000 PPM boron in 200 PPM increments in an external mixing tank. These concentrations are then circulated through the boronometer vessel. The neutron source generates neutrons that are attenuated by the varying boron concentrations. The reduction in neutron counts as detected by the boronometer's four detectors are correlated to

the proper boron concentration. This is done by a microprocessor that repeatedly solves a mathematical equation which relates neutron pulse rate, sample temperature, and PPM boron in the sample solution. Samples of the various boron calibration concentrations are also taken from the external mixing tank and analyzed through chemical analysis to determine the true boron concentration. The chemically analyzed "standard" is then compared to the boronometer indication for calibration purposes. Because the boronometer instrument error and the chemical analyses inaccuracies must be combined to determine the total error tolerance during calibration, the resulting tolerance for the boronometer indication is greater than that associated with sampling alone.

Safety Evaluation Summary

A safety evaluation was performed by Duke Power's Design Engineering Department to assess the impact on plant safety if the boronometers are removed from service. This Design Document is included as Attachment III. The safety evaluation concluded that there is no adverse safety impact associated with not using the boronometers.

Conclusion

Sampling and analysis of the reactor coolant system to monitor soluble boron concentration is the optimum method for meeting this Regulatory Guide 1.97 recommendation for Catawba Nuclear Station. The existing boronometers are not designed to perform this post-accident function, nor do they have the range and accuracy associated with sampling and chemical analyses. The boronometer indication is not referenced or required for the performance of any plant Emergency or Abnormal Operating Procedure and it does not serve as an input to the Safety Parameter Display System. Therefore, it does not meet the Station's criteria as a Type A, B, or C RG 1.97 variable.

The boronometer performs no control or protective functions, and it is not used as a basis for fundamental operating decisions. Design Engineering's safety evaluation determined that there is no adverse impact to nuclear safety associated with the non-use of this system.

Based upon the capabilities of other plant systems and administrative programs, and the lack of any unreviewed safety questions, the boronometers may be deleted. The Regulatory Guide 1.97 requirement to monitor reactor coolant soluble boron concentration may be satisfied by sampling and chemical analysis.

Table 1.9-7 (Page 13)

REGULATORY GUIDE 1.97, REV. 2 REVIEW

B-3	Variable:	RCS Soluble Boron Concentration
	Range:	0 to 6000 PPM
	Category:	3
	Existing Design:	This instrumentation has dual indication with ranges o 0 to 1250 PPM and 0 to 5000 PPM.
	Compliance:	The range is not in compliance with the recommendations of RG 1.97, Rev. 2.
	Display:	Dual range on a Control Room recorder. One computer point.
	Position:	The range of the installed instrumentation is adequate for anticipated concentrations of boron, with sampling and analysis available to provide backup information.

Table 1.9-7 (Page 13)

REGULATORY GUIDE 1.97, REV. 2 REVIEW

B-3	Variable	RCS Soluble Boron Concentration
	Range:	0 to 6000 PPM
	Category:	3
	Position:	This variable is monitored by sampling and laboratory analysis. Sampling frequency is determined by plant conditions and operating procedures.

ATTACHMENT III

Catawba Nuclear Station

Units 1 and 2

Safety Evaluation for PIR 0-C89-0370
Non-Use of the Boron Concentration Measurement System (Boronometer)