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SUBJECT: Forwards response to Generic Ltr 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary...."

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August 1, 1988

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
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Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
McGuire Nuclear Station
Docket Nos. 50-369 and 370
Catawba Nuclear Station
Docket Nos. 50-413 and 50-414
Boric Acid Corrosion of Carbon Steel Reactor
Pressure Boundary Components in PWR Plants
(Generic Letter 88-05)

Dear Sir:

By letter dated March 17, 1988, the Nuclear Regulatory Commission (NRC) transmitted the subject Generic Letter 88-05 concerning the boric acid corrosion of carbon steel reactor pressure boundary components in pressurized water reactors (PWRs). The NRC requested information to assess safe operation of PWRs when reactor coolant leaks below technical specification limits develop and the coolant containing dissolved boric acid comes in contact with and degrades low alloy carbon steel components. Furthermore, the NRC requested that Duke Power Company (Duke) provide assurances that a program has been implemented consisting of systematic measures to ensure that the reactor coolant pressure boundary will have an extremely low probability of abnormal leakage, rapidly propagating failure, or gross rupture. The program is intended to monitor small reactor coolant system leakages and to perform maintenance before the leakages could cause significant corrosion damage.

By letter dated May 23, 1988, Duke provided a partial response describing certain programs and practices currently in place and committed to submit a full response including implementation schedules by August 1, 1988. Please find attached (Attachment) Duke's response to Generic Letter 88-05.

Very truly yours,

Hal B. Tucker

Hal B. Tucker

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ATTACHMENT

DUKE POWER COMPANY
Response to Generic Letter 88-05
Boric Acid Corrosion of Carbon Steel Reactor
Pressure Boundary Components in PWR Plants

As discussed in Duke's letter of May 23, 1988, leaking coolant containing dissolved boric acid can cause carbon steel corrosion. As part of Duke's philosophy and practices for safe operation of its nuclear plants, significant industry events concerning boric acid corrosion have been reviewed and analyzed. In particular, responsive corrective actions in regard to Information Notices (80-27; 82-06; 86-108; and 86-108, Supplements 1 and 2) and Bulletin 82-02 and various INPO SERs have been taken to minimize reactor coolant system leaks and the potential damage to the primary pressure boundary components containing carbon steel. Implementation of these corrective actions through various programs, such as inspection programs, operating and maintenance procedures, performance testing, and training have substantially reduced leakage at Duke's nuclear stations.

Generic Letter 88-05 identifies four basic elements that should be included in a systematic program. Duke's program relating to each of these elements is discussed as follows:

(1) A determination of the principal locations where leaks that are smaller than the allowable technical specification limit can cause degradation of the primary pressure boundary by boric acid corrosion. Particular consideration should be given to identifying those locations where conditions exist that could cause high concentrations of boric acid on pressure boundary surfaces.

Response:

The primary method used to locate boric acid leaks will be the operator surveillances. The surveillances are controlled through administrative procedures, and are performed as a minimum when the unit is in refueling outages. The procedures will be reviewed and revised as necessary to address the potential effect of boric acid leaks. The operator surveillances will be evaluated by the individual stations and where it is deemed necessary a review of containment systems will be conducted to ensure that all potential leak locations have been identified.

(2) Procedures for locating small coolant leaks (i.e., leakage rates at less than technical specification limits. It is important to establish the potential path of the leaking coolant and the reactor pressure boundary components it is likely to contact. This information is important in determining the interaction between the leaking coolant and reactor coolant pressure boundary materials.

Response:

Implementation of operation and surveillance procedures for detection of reactor coolant leakage, as required by station Technical Specifications are the principal methods currently used at Duke nuclear stations to detect, identify, evaluate and correct any reactor coolant pressure boundary leakage. Continuous surveillance of coolant inventory, activity monitoring, sump level monitoring, and physical inspection by operating personnel will identify coolant leakages during normal operation.

In addition, a physical inspection of the reactor coolant system during each refueling shutdown is performed which will identify boric acid crystalline deposits from minute leakage during operation. Also, prior to startup following each refueling outage, the reactor coolant system is inspected under not less than operating pressure to ensure leak tight integrity during operation as required by Technical Specifications.

Duke will review and revise the existing procedures to address potential boric acid leaks. Maintenance procedures will also address the interaction between boric acid leaks and adjacent carbon steel materials.

(3) Methods for conducting examinations and performing engineering evaluations to establish the impact on the reactor coolant pressure boundary when leakage is noted. This should include procedures to promptly gather the necessary information for an engineering evaluation before the removal of evidence of leakage, such as boric acid crystal buildup.

Response:

Within the current practices at Duke's nuclear stations Work Request(s) are initiated for any identified RCS leakage to evaluate and repair the leak or any damage. Specific maintenance procedures will be developed to perform a detailed engineering evaluation to ensure that a thorough inspection of the leakage path and any surrounding component is conducted.

(4) Corrective actions to prevent recurrences of this type of corrosion. This should include any modifications to be introduced in the present design or operating procedures of the plant that (a) reduce the probability of primary coolant leaks at the locations where they may cause corrosion damage and (b) entail the use of suitable corrosion resistant material or the application of protective coatings/claddings.

Response:

As a result of the engineering evaluations corrective actions (repairs) will be initiated through the present work request system. Work requests will be evaluated for trends to reduce the probability of boric acid leaks where they may cause corrosion damage to components.

The Operating Experience program currently in place initiates a documented review of significant operating events including significant boric acid leakage. This review includes a detailed engineering evaluation and trending of similar events. As a result of this program and lessons learned form industry Duke has implemented corrective actions in an effort to control boric acid corrosion. Some examples are: 1) upgrading of steam generator manway installation procedures which address tensioning, lubricants, gaskets and gaskets surface preparation, stud materials, and stud coating, 2) extensive upgrades and comprehensive inspections of reactor coolant pumps at each outage with detailed inspections and evaluation for possible damage if boric acid build-up is present, and 3) enhanced valve inspection and maintenance programs.

Duke believes that the current programs collectively address the concerns of Generic Letter 88-05. However, Duke recognizes the need for an auditable and systematic program through enhancement of the existing programs and procedures to address the corrosive effects of reactor coolant system leakage at less than technical specification limit. Duke will develop and implement such a program to meet the intent of Generic Letter 88-05 by March 1, 1989.