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U.S. NUCLEAR REGULATORY COMMISSION
Document Control Desk
Washington, D.C. 20555

Gentlemen:

DOCKET NOS. 50-266 AND 50-301
RESPONSE TO GENERIC LETTER 88-05
BORIC ACID CORROSION OF CARBON STEEL
REACTOR PRESSURE BOUNDARY COMPONENTS
POINT BEACH NUCLEAR PLANT

On March 30, 1988, we received NRC Generic Letter 88-05, dated March 17, 1988. Generic Letter 88-05 discusses boric acid corrosion of carbon steel reactor pressure boundary components in pressurized water reactor (PWR) plants. While the potential for corrosion caused by the leakage of primary coolant containing dissolved boric acid has been recognized for some time, the letter requests that PWR licensees provide assurance that a monitoring and maintenance program consisting of systematic measures to ensure that boric acid leakage and subsequent corrosion does not lead to abnormal leakage, rapidly propagating failure, or gross rupture of the reactor coolant pressure boundary has been implemented.

In the generic letter, the NRC recommended that a boric acid leakage monitoring program should consist of four principal elements. The attachment to this letter lists each of these program elements and provides a discussion of circumstances or measures that are in place or under development at our Point Beach Nuclear Plant which address these program elements.

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It is our conclusion that the measures we have in place at Point Beach, together with those changes mentioned ir the attached discussion, provide reasonable assurance that the probability of abnormal leakage, rapidly propagating failure, or gross rupture of the reactor coolant pressure boundary due to the degrading effects of boric acid induced corrosion is very low. Should you have any questions concerning this information, please contact us.

Very truly yours,

C. W. Fay
Vice President
Nuclear Power

Copies to NRC Regional Administrator, Region III
NRC Resident Inspector

Subscribed and sworn to before me
this 24th day of May, 1988.

Delores B Gryczkowski
Notary Public, State of Wisconsin

My Commission expires: 5-27-90

Attachment

Attachment

ELEMENTS OF BORIC ACID CORROSION MONITORING PROGRAM

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 identify those locations where conditions exist that could cause high concentrations of boric acid on pressure boundary surfaces.

   The primary pressure boundary at Point Beach Nuclear Plant (PBNP) is principally constructed of stainless steel or equivalent corrosion resistant materials. Thus the pressure boundary is largely immune to the rapid boric acid wasteage described in Generic Letter 88-05. The portions of the primary pressure boundary which could be susceptible to boric acid corrosion include external surfaces of the reactor vessel, steam generator, and pressurizer. These components are internally clad with stainless steel. The primary system bolting used for mechanical joints and valves is also susceptible, as bolting is typically carbon steel. Thus, the principal locations where small leaks can cause degradation are:

   A. Mechanical joints (i.e., hand hole covers, manways, and flanged connections) to the pressurizer, steam generator, and reactor vessel.

   B. Other mechanical joints in the primary pressure boundary which use carbon steel bolting, and

   C. Valve body to bonnet joints and valve packing bolting.

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.

   Requirements for detecting and evaluating reactor coolant leakage are contained in Technical Specification 15.3.1.D, "Leakage of Reactor Coolant." Technical Specification 15.3.1.D requires that system leakage greater than 1 gpm be evaluated and that a reactor shutdown be initiated for leakage greater than 10 gpm. Our leakage detection sensitivity extends to leak rates as low as 0.013 gpm.

The primary method of detecting reactor coolant leakage is procedouralized in PBNP 4.11, "Reactor Coolant System Leakage Determination." This procedure describes the six methods of detecting and evaluating reactor coolant leakage. These are: air particulate monitoring, radiogas monitoring, containment relative humidity, containment sump drainage, reactor coolant system water balance, and in-containment physical inspection. During hot pressurized operation, the containment air particle monitor high and low values, the containment radiogas monitor high and low values, the average containment relative humidity, the average circulating water inlet temperature, the calculated gross reactor coolant system leakage, and the number of daily containment sumps drained are plotted on a six line graph once a day. This graph is periodically reviewed and evaluated by shift supervision and plant management.

PBNP 4.11 is supplemented by procedures OI-55 "Primary Leakage Rate Calculation," and PC-24, "Containment Inspection Checklist." OI-55 is a calculation of primary leakage using water inventory balances. OI-55 provides for a consistent calculated leak rate that is plotted per PBNP 4.11. PC-24 provides guidance which, in part, is used to detect and evaluate primary system leakage. In-containment physical inspections are conducted approximately every two weeks. During these inspections, leakage can be detected or evaluated by observed wetness, trace boric acid crystals, or abnormal containment sump buildup.

In addition to the procedures for detecting and locating primary coolant leakage, we have developed a program to prevent leakage from occurring. At the beginning of each outage, a formal inspection is conducted for valve leakage using CL-4D, "Outage Valve Inspection Checklist." CL-4D includes a list of over 250 individual valves, each of which are inspected for packing leaks or body-to-bonnet leaks. Any identified leaks are evaluated and repaired during the upcoming outage. At the end of each outage, a leak test is performed per IT-230/235, "Leak Test of Class 1 Components Following a Refueling Shutdown." IT-230/235 fulfills the ASME Section XI requirement to leak test all safety-related Class I components following a refueling outage and ensures primary system integrity. The IT-230/235 inspection for leakage is conducted with a qualified inspector in conjunction with a qualified operator. These individuals "tour" the primary system together to identify any leakage.

While we believe that IT-230/235 is adequate, a formal inspection procedure would be more consistent with the pre-outage inspection using CL-4D. Accordingly, we will revise IT-230/235 to include an inspection checklist consistent with the principal leakage locations discussed in the preceeding section 1. We expect to complete the IT-230/235 revision prior to the next leak test for each unit.

3. Methods for conducting examinations and performing engineering evaluations to establish the impact on the reactor coolant pressure boundary when leakage is located. 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.

PBNP has not experienced significant problems with boric acid corrosion. Primary system leakage, when it does occur, is usually limited to minor valve packing weepage or similar type leaks. This type of leakage is corrected through our maintenance program using procedure PBNP 3.1.3, "Maintenance Work Request." PBNP 3.1.3 is adequate for evaluating such minor leakage.

More extensive leakage characterized by significant boric acid crystal buildup or primary pressure boundary corrosion would be evaluated using QP 15-1, "Control of Nonconformances." This procedure is adequate for evaluating the more significant instances of primary system leakage. Specific evaluation methodology and examination technique would, of course, depend on the circumstances of a specific situation. As such, specific procedures for examination and evaluation of reactor coolant leakage do not exist and, we believe, are not essential.

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 materials or the application of protective coatings/claddings.

As previously noted, PBNP has not experienced significant problems with boric acid corrosion. This favorable operating experience results from the use of corrosion resistant material and a policy of minimizing primary coolant leakage. For example, in 1979 we amended our operating license to reduce our primary system pressure to 2000 psi. We took this action, in part, to reduce the potential for primary system leakage. More recently, we replaced a portion of the primary pressure boundary piping to eliminate valves that had a history of developing small packing leaks. Based on our operating experience to date, we believe that the existing design of the PBNP primary pressure boundary, along with existing procedures controlling primary leakage, provides assurance that the reactor coolant pressure boundary will have an extremely low probability of abnormal leakage, rapidly propagating failure, or gross rupture. We shall continue to monitor operating experience relating to boric acid corrosion and take appropriate corrective actions.