

April 25, 2002

Mr. Svend Dalgaard, PE
1134 Bald River Road
Tellico Plains, TN 37385-6110

SUBJECT: Davis Besse Generating Station

Dear Mr. Dalgaard:

Thank you for your interest in the issue of the recent boric acid corrosion of the nuclear reactor vessel head and in sharing with us your ideas about the subject.

Although boric acid is a weak acid it still, under certain circumstances, can produce significant corrosion of carbon steel. However, we acknowledge that we didn't expect that boric acid corrosion would happen at this temperature. The data reported by Westinghouse (Reference 1) have indicated that 25 percent, aerated solution of boric acid at 200°F can corrode carbon steel at a rate of 400 mils/month. Even dry boric acid crystals at 500°F will corrode carbon steel at between 0.8 and 1.6 mils/month.

Although in the primary coolant boric acid is in an orthoboric form, when it leaks out and comes in contact with a hot surface, it is transformed into metaboric acids (Reference 2). These acids are considerably less volatile than the orthoboric form and will stay deposited on hot surfaces such as the nuclear reactor vessel head.

The amount of lithium present in the primary coolant is considerably lower than boric acid. Depending on the mode of primary coolant chemistry, the cycle average percentage of lithium in the primary coolant additive varies but it is less than 0.05 percent. This lithium will be in a form of dilithium tetraborate and lithium metaborate. These compounds are stable and at the temperatures existing on the reactor vessel head, it is very unlikely that a free lithium hydroxide could be formed.

In conventional power plants, damage to carbon steel components by a caustic corrosion is a very serious problem, and we are grateful to you for bringing it to our attention. However, due to the significantly different water chemistry in nuclear plants, occurrence of caustic attack of carbon steel components is not expected. However, we are still evaluating the root cause of the current corrosion damage to the reactor vessel head.

Sincerely,

/ra by Brian W. Sheron f/

Samuel J. Collins, Director
Office of Nuclear Reactor Regulation

References:

- (1) NRC Generic Letter 88-05, Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants, March 17, 1988
- (2) Kirk-Othmer Encyclopedia of Chemical Technology, Vol 4, Published by John Wiley & Sons, 1992

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