UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

R. Tilton
RSB

JUL 26 1977

MEMORANDUM FOR: L. C. Shao, Chief, Engineering Branch, DOR

FROM: F. M. Almeter, Engineering Branch, DOR

SUBJECT: LiOH ADDITION TO PWR SECONDARY COOLANT

I have discussed with Mr. D. Marburger and Dr. D. Malinowski of the Westinghouse Engineering Staff about the rumor that Westinghouse was using LiOH additions to the secondary coolant at Turkey Point Unit No. 4 to retard steam generator tube denting. Both individuals stated that Westinghouse had not specifically added LiOH in the secondary coolant at any Westinghouse PWR plant .

Westinghouse did perform some measurements to determine the amount of hydrogen in the steam phase at the Surry and Turkey Point plants. The occurrence of hydrogen in the steam phase is believed to be given off during the formation of magnetite in the tube/tube support plate annulus which causes tube denting. The rate of hydrogen formation in the steam phase at Turkey Point Unit No. 4 was higher than any of the Surry Units, and the hydrogen level decreased when ever primary-to-secondary leakage ocurred at Turkey Point. Westinghouse believes that the lithium-borate from the primary coolant may have decreased the corrosion rate of the carbon steel tube support plate; since the degree of tube denting in the Turkey Point steam generators is less than the Surry Units. The primary coolant in the Westinghouse PWR's contains LiOH and boric acid with a hydrogen over pressure. Lithium-Borate is formed during the radiohydrolysis of the primary coolant. The amount of lithium-borate is in the ppb range.

As a consequence of the observations at Surry and Turkey Point, Westinghouse is performing pot boiler tests by doping the secondary coolant with lithium-borate, calcium hydroxide, and boric acid. Single additions of each compound, in the ppb range, did decrease the rate of denting. Although these laboratory tests are still in the experimental stage, they believe that either of these compounds have a passivating effect on carbon steel in the presence of chloride salts; i.e., FeCl, etc. Westinghouse did inject 1 ppb boric acid into the secondary coolant at Surry and observed that the level of hydrogen production in the steam phase was reduced. The Zion plant has had boric acid in the secondary coolant by accident and has experienced no denting and no deleterious effect on the materials in the secondary side. Boric acid is very volitale and readily soluble in the steam. Similar incidences have ocurred in the German Plants and there has been no effect, with the carryover of boric acid, on the turbine side or the secondary side .

Since these laboratory experiments are proprietary and preliminary, Westinghouse was not prepared to give further details and categorically stated that they have not nor are they yet ready to use any of these methods to reduce tube denting in any operating plant.

F. M. Almeter

F. M. Almeter
Engineering Branch
Division of Operating Reactors

cc: D. Eisenhut
W. Hazelton
R. Stuart
L. Frank
B. D. Liaw
D. DiIanni