D/F

DECEMBER 17 1979

Dockets Nos. 50-269, 270, 287
289, 302, 312, 313,
and 346

MEMORANDUM FOR: Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

FROM: E. L. Conner, Project Manager
Operating Reactors Branch #4
Division of Operating Reactors

SUBJECT: FORTHCOMING MEETING WITH B&W AND B&W LICENSEES ON CONTROL ROD GUIDE TUBE WEAR

Time, Date & Location: 9:30 a.m., Phillips Building, December 20, 1979
Bethesda, Maryland, Room P-500

Purpose: To discuss the results of preliminary inspection and proposed inspection planned to resolve the enclosed staff concerns.

Participants:

NRC
S. Weiss, F. Coffman, R. Riggs, E. Conner, N. Fairtile, G. Vissing, B. Garner, and J. Stiasny

B&W
R. Pirecki and K. Stein

DPC
S. Hill, R. Wilson, J. McCallum, R. Hill, and J. Frech

SMUD
R. Dieterich

AP&L
E. Grant

MET ED
W. Wilkerson, R. Fenzak, and G. Bond

FPC
B. Simpson and B. Bright

TECO
T. Meyers

Original Signed By

8001230034

OFFICE	ORB#4:DOR	ORB#4:DOR	E. L. Conner, Project Manager Operating Reactors Branch #4 Division of Operating Reactors		
SURNAME	MConner:kb	RReid			
DATE	12/ /79	12/ /79			

MEETING NOTICE DISTRIBUTION

ORB#4

Docket File
NRC PDR
L PDR
ORB#4 Rdg
NRR Rdg
H. Denton
E. G. Case

D. Eisenhut
R. Vollmer
W. Russell
B. Grimes
T. J. Carter
A. Schwencer
D. Ziemann
T. Ippolito
R. Reid
V. Noonan
P. Check
G. Lainas
G. Knighton
Project Manager
OELD
OI&E(3)
OSD
S. Showe, I&E (PWR)
R. Ingram
Receptionist, Bethesda
R. Fraley, ACRS (16)
Program Support Branch
TERA
J. R. Buchanan
Meeting Notice File
NRC Participants
S. Weiss
F. Coffman
R. Riggs
E. Conner
M. Fairtile
G. Vissing
D. Garner
D. DiIanni

W. Gammill
L. Shao
J. Miller
AEOD
P. T. Kuo (seismic reviews only)
H. Gaut, State Programs

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

December 17, 1979

Dockets Nos. 50-269, 270, 287,
289, 302, 312, 313,
and 346

MEMORANDUM FOR: Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

FROM: E. L. Conner, Project Manager
Operating Reactors Branch #4
Division of Operating Reactors

SUBJECT: FORTHCOMING MEETING WITH B&W AND B&W LICENSEES ON CONTROL ROD GUIDE TUBE WEAR

Time, Date & Location: 9:30 a.m., Phillips Building, December 20, 1979
Bethesda, Maryland, Room P-500

Purpose: To discuss the results of preliminary inspection and proposed inspection planned to resolve the enclosed staff concerns.

Participants:

NRC
S. Weiss, F. Coffman, R. Riggs, E. Conner, M. Fairtile, G. Vissing, D. Garner, and D. DiIanni

B&W
R. Pjrekh and K. Stein

DPC
B. Gill, K. Wilson, B. McCallum, P. Guill, and D. Frech

SMUD
R. Dieterich

AP&L
E. Grant

MET ED
W. Wilkerson, R. Pensak, and G. Bond

FPC
B. Simpson and R. Bright

TECO
T. Meyers

Monte Conner

E. L. Conner, Project Manager
Operating Reactors Branch #4
Division of Operating Reactors

Enclosure

NRC CONCERNS ON CONTROL ROD GUIDE TUBE WEAR IN FACILITIES DESIGNED BY B&W

The B&W surveillance experience on worn control rod guide tubes, as described in their January 12, 1979 letter, consists of (a) air testing of sixteen guide tubes from an Oconee-1 15x15 fuel assembly that had experienced one cycle of operation under a control rod assembly and (b) clam-shell sectioning of two guide tubes from a 17x17 fuel assembly that had undergone a 1000-hour flow test under a control rod assembly. As documented in our letter of August 22, 1979, we find that this experience is not sufficient to support the B&W conclusion that there is strong evidence for the absence of wear in B&W-designed plants. In fact, to the contrary, worn guide tubes have been observed in Crystal River, Unit 3 spent fuel (see BAW-1490 Rev. 1, July 1978). Our position is further based on observations made by other NSSS vendors who have found a "plant-specific" and "core-position" dependence in the observed wear. Furthermore, out-of pile flow tests have demonstrated that the wear rate is a function of several design and operating variables.

1. Propose a post-irradiation examination (PIE) program with a schedule for its implementation and a commitment to execute the program for NRC review. This data-gathering program should be completed expeditiously considering the availability of irradiated assemblies in all B&W-designed plants. Details of the surveillance plan should include the following:

   a. Methods of examination (e.g., destructive, eddy current probe, boroscope, mechanical gage) accompanied by qualification of those methods.

   b. Characterization of the examined guide tubes, including their in-core locations, EFPHs, flow rates, fluence, and wear time under rods (control, instrument, axial-power shaping, burnable poison, startup source, and orifice).

   c. Examination of those rods (control, instrument, axial-power shaping, burnable poison, startup source, and orifice) contained within the guide tubes to identify fatigue, stress corrosion cracking, wear, denting, or any other conditions that can degrade their design function, reduce their design lifetime, or impede their movement.

d. Analysis of results including quantification of guide tube wall wear depth and distribution. This PIE program may be satisfied in part of totality by reference to data taken from another B&W designed plant(s) that uses the same type of fuel assemblies. In such case, justification must be given that wear in the referenced plant adequately represents that of the plant design in question.

Provide all correlations supported by your tests and discuss how these correlarions are used to predict guide tube wear during reactor operations over the fuel lifetime.

2. Provide an evaluation on the predicted guide tube wear on the stress analyses contained in the FSAR. The evaluation should address loadings associated with Condition-1 through -4 events including fuel handling accidents, control rod scrams, and seismic and LOCA transients. The discussion should describe the state of stress in the worn guide tubes and how the wear affects the loadbearing characteristics of the worn tubes. (Note that nonuniform wear results in a shift of the neutral tube axis which then induces not only direct stresses but also bending stresses.) Show that the loadbearing capacity of the worn guide tubes satisfies the acceptance criteria for these loading events.

3. Provide or reference all material property correlations that are used in the guide tube stress analyses. These correlations should accommodate the effects of hydrogen absorption and the propensity for hydrogen uptake in the Zircaloy guide tubes as a function of accumulative wear.

4. Address the consequences of hole formation in worn guide tubes. Consider the extent and distribution of wear to see if hole formation is possible. If the potential for hole formation cannot be discounted, evaluate the impact of such holes on the guide tube integrity, control rod motion and local thermal-hydraulic performance. This evaluation should account for flow-induced vibration resulting in crack propagation and possible fatigue fracture in locally thinned areas of the tube wall. This discussion should also address the entire core residence time, both during periods of wear (under rods; i.e., control, instrument, axial-power shaping, burnable poison, startup source, and orifice) and when the tubes are not rodded.