

MAR 2 1973

Docket No. 50-269

R. C. DeYoung, Assistant Director for Pressurized Water Reactors, L
THRU: A. Schwencer, Chief, Pressurized Water Reactors Branch No. 4, L

VISIT TO BABCOCK & WILCOX, LYNCHBURG, VIRGINIA, FACILITIES -
OCONEE 1 FUEL DENSIFICATION AND ECCS - MARCH 1 AND 2, 1973

Enclosed is a summary and discussion of the visit made by
the staff to B&W Lynchburg facilities on March 1 and 2, 1973.
Also enclosed are attendance lists for the meetings held during
the visit.

Irving A. Peltier, Project Manager
Pressurized Water Reactors Br. No. 4
Directorate of Licensing

Enclosures:

1. Meeting Summary
2. Attendance List - Fuel Densification Task Force
3. Attendance List ECCS Meeting
4. Attendance List Fuel Densification Meeting March 2, 1973

cc: AEC PDR
Local PDR
RSBoyd
DSkovholt
DKnuth
RMaccary
RTedesco
HDenton
PWR Branch Chiefs
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MRosen
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B&W has confirmed that this report does not contain any proprietary information.

OFFICE ▶	AEC participants	PWR-4	L:C/PWR-4		
SURNAME ▶		IAPeltier	ASchwencer		
DATE ▶		3/13/73	3/29/73		

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ENCLOSURE 1
VISIT TO BABCOCK & WILCOX
LYNCHBURG, VIRGINIA FACILITIES
OCONEE 1 - FUEL DENSIFICATION AND ECCS
MARCH 1 AND 2, 1973

Summary

The visit by the staff to B&W Lynchburg, had three major activities. They were:

- (1) Tour of fuel fabrication facilities. (March 1, 1973)
- (2) Meeting on fuel densification analysis. (March 2, 1973)
- (3) Meeting on ECCS analysis. (March 1, 1973)

The tour of the fuel fabrication facility was useful in helping the staff to understand how parameters affecting fuel densification are measured and controlled and to understand how Oconee Unit 1 fuel is different from fuel for other B&W plants now under fabrication.

The fuel densification meeting was used to discuss TAFY results compared to measured data, clad creep and collapse time assumptions, and to present data to the staff on fuel pellet resintering. Answers to informal questions raised by the staff were discussed also.

With regard to fuel densification, the staff plans to send its request for additional information to Duke Power by March 15, 1973. B&W plans to make only minor modifications to the fuel densification reports BAW-10054 and BAW-1387 and respond to all requests by mid-April. With this schedule the staff feels that it can complete its Oconee 1 review by May 1, 1973. B&W intends to meet the Oconee 1 schedule and to make appropriate changes on other customer applications.

With regard to the CFT line break accident, it is the staff's understanding that B&W is no longer considering conducting its own tests because Duke Power has contracted to use an existing Westinghouse test facility for the same purpose. This Westinghouse facility is proprietary but Westinghouse plans to make it public

in April. The staff feels that more information concerning this facility is necessary before April. It was agreed that the L-PM would contact Duke on this matter immediately and arrange a visit to the Westinghouse facility for the staff.

Discussion - Fuel Fabrication Facility Tour

The AEC visitors were briefed by B&W on the organizational structure of the Commercial Nuclear Fuel Department, CMFD, of the Nuclear Power Generation Division of B&W and conducted on a tour of the fuel fabrication facility.

At the fuel fabrication facility, the process starts with receipt of fuel pellets, cladding and spacer grids and ends with either storage or shipment of completed fuel assemblies. Other components of the assembly are fabricated by B&W at the facility. The independent B&W quality control organization conducts an in-process check and inspection at all stages of the fabrication process.

The AEC group was primarily interested in factors which relate to fuel densification. The principal areas of concern were:

- (1) Measurement of Pellet dimensions.
- (2) Determination of statistical variation in pellet and clad dimensions.
- (3) As-built tolerances.
- (4) Fuel density measurements.
- (5) Profilometer measurements.
- (6) Creep tests
- (7) Porosity of pellets.
- (8) Verification of pin pressure.
- (9) Power spike measurements.
- (10) Differences between Oconee 1 and other B&W fuel.

There were several differences between the fuel being fabricated at the time of the visit and the fuel fabricated for Oconee 1 and 2. The more significant of these differences are:

- (1) Oconee 1 rods were pre-pressurized with helium without an initial one atmosphere of dry nitrogen.
- (2) Oconee fuel pellets are not resintered. Resintering is presently a step in the fabrication process.

The present Duke application Oconee FSAR, provides for the installation and post-irradiation of a few fuel rods of this new type in Oconee 1. It is our understanding that this plan is being abandoned by Duke and B&W for the first core.

The AEC group was briefed on the joint AEC-B&W Fuel Gap Detectability Study being conducted by B&W in its critical facility. The group visited the critical facility to view the assembly. B&W is preparing two reports, BAW-3647-25 and BAW-3647-26, on this work. The critical assembly had 9 central fuel assemblies, (15 x 15 rod array) in a 3 x 3 configuration, which were essentially standard fuel assemblies. Built into the standard fuel assemblies were six pins with built in gaps in the fuel. The gap lengths were 3", 1 1/2" and 3/4" and the gaps were staggered in axial and radial location. Gold wires and rhodium detectors were used to measure the flux peaks at various pitch distances from the gaps. Preliminary results of these experiments show that the maximum spike is approximately 5 to 6% in amplitude. This work is scheduled to be completed by mid-April.

Discussion - Meeting on Fuel Densification Analysis

In this meeting B&W stated that its fuel collapse model compared to BUCKLE is conservative. The staff is still evaluating both the B&W and BUCKLE calculations.

B&W is modifying the code input to use more realistic core history on clad temperature and irradiation.

Also in this meeting B&W gave the TAFY calculated centerline temperatures for measured experimental results from experiments at Chalk River, Halden and experiments reported in WCAP-2923 and WAPD-228. B&W felt that the TAFY results are realistic and in areas of unknown are conservative. These results will be reported to the AEC formally.

B&W intends to make only minor modifications in its topical BAW-10054 and BAW-1387 to eliminate the 2% variation on pellet diameter and to alter the assumed spike width. It was reiterated that the Oconee 1 review deals only with the first fuel cycle in Oconee 1 and that the models may have to be altered for subsequent cycles on other plants.

There was a lengthy discussion of what B&W has learned about the effects of sintering from the Battelle irradiation experiments on fuel pellets for a number of B&W contracts. Short fuel rods were irradiated for selectively short times to be extended to 2000 MWD/T.

Discussion - Meeting on ECCS Analysis

B&W discussed in very general terms the experiments to be conducted by Westinghouse in its proprietary facility on a Duke contract. Westinghouse plans to make information about this facility public at an industrial meeting the 13th of April. Since the data is to be used for supporting the analytical models now being evaluated by the staff, the staff felt that April 13th is too late for the Oconee 1 review. The staff prefers to visit and discuss the facility within two weeks. The matter was left to be discussed with Duke with the hope that Duke could negotiate an early visit date with Westinghouse.

It is the staff's understanding that the tests to be run by Westinghouse for Duke will not be quite the same as those suggested for the FLECHT facility. This is primarily due to some physical limitations of the facility and some precautions being exercised by Westinghouse to protect the rod bundles against high temperature burnout.

ENCLOSURE 2
FUEL DENSIFICATION TASK FORCE
CNFP VISIT

<u>Name</u>	<u>Organization</u>
R. N. Edwards	B&W
R. A. Turner	B&W
I. A. Peltier	AEC
D. Houston	AEC
H. Schierling	AEC
S. B. Kim	AEC
D. Ross	AEC
D. K. Davis	AEC
E. J. Silk	B&W - CNFP
R. A. Alto	B&W - CNFP
J. Ficor	B&W - CNFP
N. Baldwin	B&W - CNFP
C. Mayes	B&W - CNFP

ENCLOSURE 3
ECCS MEETING

<u>Name</u>	<u>Organization</u>
J. Mallay	B&W
C. Parks	B&W
W. Brunson	B&W
D. Roy	B&W
R. Straub	B&W
D. Ross	AEC
D. Davis	AEC
I. Peltier	AEC
H. Schierling	AEC

ENCLOSURE 4
FUEL DENSIFICATION MEETING
MARCH 2, 1973

<u>Name</u>	<u>Organization and Title</u>
R. Edwards	B&W, Licensing Supervisor
R. Straub	B&W, Project Manager
M. Sankovich	B&W, Manager, Fuel Engineering
J. Tulenko	B&W, Manager, Physics
J. Andrews	B&W, Unit Manager, Core Development
S. Hellman	B&W, Fuel Contracts
D. DeMars	B&W, Manager, Mechanical Analysis and Development
J. Korthen	Duke Power, Steam Production Department Core Performance Engineer
R. Lobel	USAEC, Fuel Pin Thermal; GAPCON
S. Kim	USAEC, Mechanical; BUCKLE, Creep, etc.
D. Ross	USAEC, General
H. Schierling	USAEC, Densification Coordination
D. Davis	USAEC, Thermal-Hydraulics
M. Houston	USAEC, Fuel & Materials Standards
W. Brunson	B&W, Manager, Nuclear Contracts
I. Peltier	AECI-PM, Oconee
L. Losh	B&W, TAFY Comparison
G. Hatfield	B&W, Mechanical Analysis and Development Unit
R. Turner	B&W, Fuel Densification Coordinator
A. Guay	B&W, Manager, Materials and Irradiation