



**Wisconsin Electric** POWER COMPANY  
231 W. MICHIGAN, P.O. BOX 2046, MILWAUKEE, WI 53201

April 16, 1980

Mr. H. R. Denton, Director  
Office of Nuclear Reactor Regulation  
U. S. NUCLEAR REGULATORY COMMISSION  
Washington, D. C. 20555

Dear Mr. Denton:

DOCKET NO. 50-301  
REACTOR VESSEL MATERIALS SURVEILLANCE CAPSULE TEST REPORT  
POINT BEACH NUCLEAR PLANT UNIT 2

Capsule R of the Point Beach Nuclear Plant Unit 2 Reactor Vessel Materials Surveillance Program was removed in accordance with the schedule set forth in the plant Technical Specifications. The testing, except for wedge-open-loading (WOL) specimens, has been completed and the results are contained in Westinghouse Electric Corporation report WCAP-9635. Five copies of this report are enclosed herewith for your information.

A brief summary report of the results of this testing is attached hereto. While these test results do not appear to support the concept of saturation of irradiation-induced embrittlement, EPRI is pursuing the testing of additional surveillance capsules. The test results do support the continued use by Point Beach Nuclear Plant of the transition temperature shift curve discussed in the plant Technical Specifications.

In Mr. A. Schwencer's letter of February 27, 1979 to Mr. Sol Burstein, we were advised that NRC planned to have recommendations for testing and analysis of WOL specimens available in early 1980. We would be pleased to receive these recommendations so that we can complete our efforts in this regard.

Very truly yours,

C. W. Fay, Director  
Nuclear Power Department

Enclosures

A021  
S  
1/1

8004220278

SUMMARY REPORT OF WCAP - 9635

ANALYSIS OF CAPSULE R FROM THE WISCONSIN  
ELECTRIC POWER COMPANY POINT BEACH  
NUCLEAR PLANT UNIT NO. 2 REACTOR  
VESSEL RADIATION SURVEILLANCE PROGRAM

Point Beach Nuclear Plant Unit No. 2 was shut down on March 23, 1979 for its fifth refueling outage, and Capsule R was removed from the reactor vessel in early April. Capsule R resided within the reactor vessel for approximately 5.1 effective full power years of operation. Because of the capsule lead factor (now 3.37), the capsule represents about 53.7% of the reactor vessel life for radiation embrittlement considerations.

This capsule was tested by Westinghouse Electric Corporation as part of EPRI Research Project 1021-3 pertaining to the possible saturation of radiation induced embrittlement in reactor vessel materials. The final report was transmitted to Wisconsin Electric by an EPRI letter dated March 13, 1980 in which it is stated "...that the results indicate that a saturation of the radiation damage has not occurred...". However, EPRI concludes that it is too early to dismiss the concept of embrittlement saturation and is pursuing the testing of eleven additional capsules.

The evaluation of the Capsule R thermal monitors indicated that the maximum temperature to which the test specimens was exposed was less than 579°F.

Capsule R received an average fast fluence of  $2.01 \times 10^{19}$  n/cm<sup>2</sup> (E > 1 Mev) versus a predicted fast fluence of  $2.14 \times 10^{19}$  n/cm<sup>2</sup> (E > 1 Mev). The materials transition temperature shifts caused by this radiation exposure is presented in Table 5-6 of the report and is summarized as follows:

<u>Material</u>	<u>Transition Temperature Shift, °F</u>			<u>Charpy V-Notch Energy Level, ft-lbs.</u>	
	<u>At 50 ft-lb Level</u>	<u>At 30 ft-lb Level</u>	<u>At 35 mils L. Exp.</u>	<u>Upper Shelf</u>	<u>Change from Unirrad.</u>
1. Intermed. Shell (123V500VA1)	70	70	85	189	+9
2. Lower Shell (122W195VA1)	30	35	52	140	-5
3. Weld Metal	-	230	230	47	-18
4. HAZ (extensive data scatter)	195	190	166	108	+24.5
5. Correl. Monitor Material	159	151	167	98	-25.5

In Figure 5-6 of the report (copy attached hereto), the transition temperature shift versus fluence is shown in comparison to the Westinghouse prediction curves for the three Unit 2 capsules that have been tested. The figure shows that the highest prediction curve (0.25 WT% Cu Weld) is acceptable for continued use for the PBNP Unit 2 reactor vessel heatup and cooldown curves; this is the prediction line referred to on page 15.3.1-7 of the plant Technical Specifications.

Section 6 of the report pertains to the radiation analysis and neutron dosimetry work for Capsule R. One significant aspect of this work is the revised capsule lead factors presented in Table 6-3 of the report. These lead factors are compared to those presented in WCAP - 9331 (Unit 2, Capsule T, August 1978) as follows:

<u>Capsule Identification</u>	<u>Lead Factors</u>	
	<u>WCAP 9635</u>	<u>WCAP 9331</u>
V & R	3.37	2.5
T & P	1.94	1.6
S & N	1.79	1.4

The change in the lead factor explains why Capsule R represents about 54% of the reactor vessel lifetime exposure versus the planned 40% by the capsule withdrawal schedule (Table 15.3.1-2 of the plant Technical Specifications).

The wedge-opening-loading (WOL) fracture mechanics specimens were not tested and are simply being stored at this time.

5-25

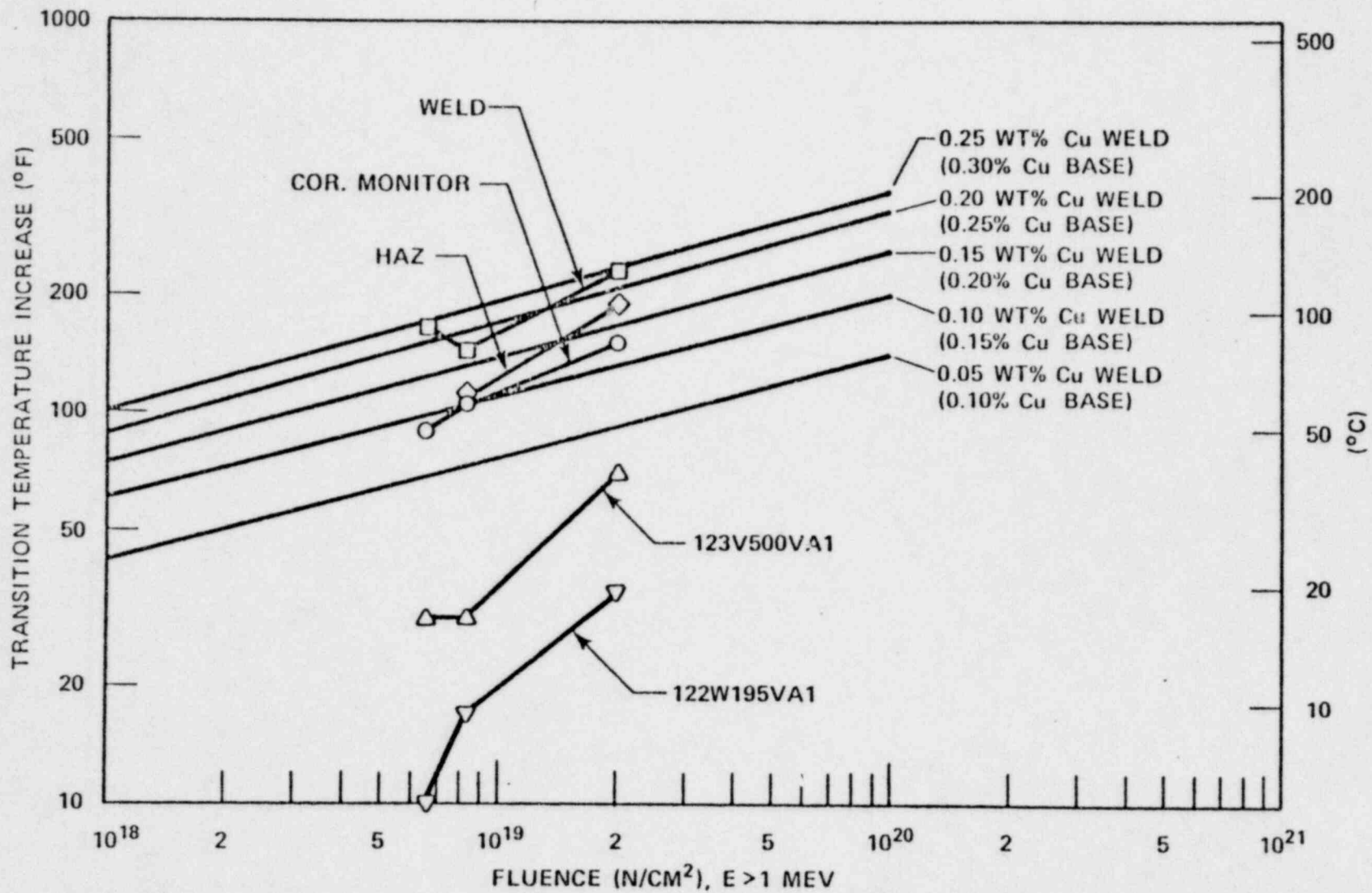


Figure 5-6. Point Beach Unit No. 2 Material 30 ft lb Transition Temperature Increases as Compared to Westinghouse Predictions  
(from WCAP-9635)