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MONTHLY PROGRESS REPORT  
BATTELLE-NORTHWEST STUDIES EXECUTED FOR THE USAEC-AECI COOPERATIVE PROGRAM  
ON DEVELOPMENT OF HEAVY WATER MODERATED POWER REACTORS  
JANUARY 1965

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This document is furnished pursuant to the Memorandum of Understanding of June 7, 1960, between the U.S. and Canadian Governments, establishing a cooperative program on the development of heavy water moderated power reactors.

Reviewed and Approved for  
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*Donald J. Brown* PNNL ADD  
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MONTHLY PROGRESS REPORT  
ZR-2.5 NIOBIUM ALLOY STUDIES  
USAEC-AECL COOPERATIVE PROGRAM  
JANUARY 1965

R. G. Wheeler

About seventy-five feet of Zr-2.5 Nb alloy tubing has been received. This material was supplied in two cold worked tempers - 60% CW and 30% CW. Due to the fact that much of the tubing in the 30% CW temper sustained ID surface cracking, the vendor will produce an additional 20 feet of tubing in the 30% CW temper. The initial lot of tubing was produced as follows:

- 1) Extrude at 1450 F, and with an extrusion ratio of about 19 to 1, to produce an extrusion blank 3.00" OD x 0.300" wall thickness.
- 2) Tube reduce cold all extrusion blanks from 3.00" OD x 0.300" wall to 2.625" OD x 0.250" wall thickness. The cold reduction in this step is approximately 30% and about half of the tubing was supplied in this condition.
- 3) Anneal the remaining half for two hours at about 1100 F.
- 4) After annealing tube reduce cold from 2.625" OD x 0.250" wall to 2.375" OD x 0.180" wall thickness

Upon receipt of the tubing at the Pacific Northwest Laboratory, it was non-destructively examined by means of ultrasonic, Zygo and white light bore-scope inspections for ID surface cracking. A few defect areas have been sectioned for metallographic examinations. Additional effort on metallographic techniques are needed before the reason for the inside surface cracking can be determined. Upon completion of the nondestructive examinations the strength of the tubing in both cold worked tempers will be evaluated by burst testing at room temperature, 550 F and 750 F.

MONTHLY PROGRESS REPORT  
HEAT TRANSFER AND FLUID FLOW STUDIES  
USAEC-AECL COOPERATIVE PROGRAM  
January, 1965

G. M. Hesson and J. M. Batch

Fog-Cooling of 19-Rod Bundles

Fabrication of parts for the 6.3-foot long 19-rod bundle electrically heated test section with 0.040-inch spacing between rods is about 60 per cent complete. All materials required by the modification to the 0.040-inch rod-to-rod spacing are on hand except the heater rod tubing. Delivery of the heater rod tubing is expected within the next two weeks.

Tentative run plans were developed for the test section. The tests will include the use of two inlet piping configurations, a rough- and a smooth-walled pressure tube and both subcooled and quality steam coolant at the test section inlet. The proposed runs include about 90 boiling burnout determinations covering seven different combinations of inlet coolant conditions, pressure tube wall, inlet piping configurations, and pressures.