

FRAMATOME ANP, Inc.

November 4, 2004
NRC:04:061

Office of Nuclear Regulatory Research
ATTN: Ralph O. Meyer, Senior Technical Advisor
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Shipment of Zircaloy Cladding to ANL

Dear Ralph:

Framatome ANP plans to ship Zircaloy cladding to Argonne National Laboratory for use in programs related to high burnup LWR cladding and dry cask storage. This cladding is from older production stock and is as close an approximation of the HB Robinson irradiated cladding, being used in the ANL programs, as we currently have available. We are providing approximately 22 feet of material.

One of the final steps used in producing this genre of cladding was to dress the inside of the cladding using a pickling process. This pickling, which is no longer used by western manufacturers, leaves a fluoride residue on the interior surface of the cladding. Because fluoride can affect cladding oxidation, this cladding should not be used for double sided oxidation tests beyond those intended to serve as a base line for the irradiated HB Robinson fuel rod tests.

If you require samples for testing beyond the HB Robinson baselining, Framatome ANP can supply samples of current production Zircaloy which is grit polished on the inside and belt polished on the outside of the cladding as part of the final finishing process.

This cladding is stress relieved and annealed and has the following properties:

Alloy	Zircaloy-4
Nominal outside diameter	0.424 inches
Nominal inside diameter	0.364 inches
Framatome ANP tracking numbers	
Richland Batch Number	0000108066
Duisburg Lot Number	A0219-33
ROB-17 HRB	
PO number	4104074462 line item 10
Man Readable Serial Number (pin 1)	A7 0219 33 0231
Man Readable Serial Number (pin 2)	A7 0219 33 0288
Tin content	1.30 weight percent
Oxygen content	1380 ppm

Tensile properties

0.2 % yield strength at room temperature	596 N/mm ²
Ultimate strength at room temperature	777 N/mm ²
Elongation at room temperature	21 %
0.2 % yield strength at 382 C	368 N/mm ²
Ultimate strength at 382 C	456 N/mm ²
Elongation at 382 C	23 %

Closed-end burst test at room temperature

Maximum fluid pressure	1428 Bar
Ultimate hoop strength	959 N/mm ²
Circumferential elongation	12.1 %

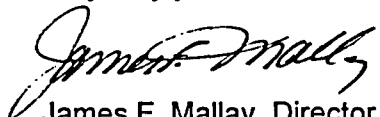
Hydride orientation, fraction radial Not in Certificate

Final heat treatment	
Time	5 hours
Temperature	490 C

A copy of this letter will be enclosed with the shipment.

Framatome ANP looks forward to continuing to work with ANL and the NRC on these projects

Very truly yours,


James F. Mallay, Director
Regulatory Affairs

cc: M. J. Billone (ANL)
Project 728



FRAMATOME ANP

An AREVA and Siemens Company

FRAMATOME ANP, Inc.

November 4, 2004
NRC:04:061

Office of Nuclear Regulatory Research
ATTN: Ralph O. Meyer, Senior Technical Advisor
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Shipment of Zircaloy Cladding to ANL

Dear Ralph:

Framatome ANP plans to ship Zircaloy cladding to Argonne National Laboratory for use in programs related to high burnup LWR cladding and dry cask storage. This cladding is from older production stock and is as close an approximation of the HB Robinson irradiated cladding, being used in the ANL programs, as we currently have available. We are providing approximately 22 feet of material.

One of the final steps used in producing this genre of cladding was to dress the inside of the cladding using a pickling process. This pickling, which is no longer used by western manufacturers, leaves a fluoride residue on the interior surface of the cladding. Because fluoride can affect cladding oxidation, this cladding should not be used for double sided oxidation tests beyond those intended to serve as a base line for the irradiated HB Robinson fuel rod tests.

If you require samples for testing beyond the HB Robinson baselining, Framatome ANP can supply samples of current production Zircaloy which is grit polished on the inside and belt polished on the outside of the cladding as part of the final finishing process.

This cladding is stress relieved and annealed and has the following properties:

Alloy	Zircaloy-4
Nominal outside diameter	0.424 inches
Nominal inside diameter	0.364 inches
Framatome ANP tracking numbers	
Richland Batch Number	0000108066
Duisburg Lot Number	A0219-33
ROB-17 HRB	
PO number	4104074462 line item 10
Man Readable Serial Number (pin 1)	A7 0219 33 0231
Man Readable Serial Number (pin 2)	A7 0219 33 0288
Tin content	1.30 weight percent
Oxygen content	1380 ppm

Tensile properties

0.2 % yield strength at room temperature	596 N/mm ²
Ultimate strength at room temperature	777 N/mm ²
Elongation at room temperature	21 %
0.2 % yield strength at 382 C	368 N/mm ²
Ultimate strength at 382 C	456 N/mm ²
Elongation at 382 C	23 %

Closed-end burst test at room temperature

Maximum fluid pressure	1428 Bar
Ultimate hoop strength	959 N/mm ²
Circumferential elongation	12.1 %

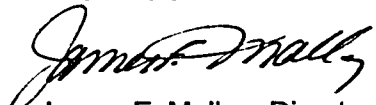
Hydride orientation, fraction radial Not in Certificate

Final heat treatment	
Time	5 hours
Temperature	490 C

A copy of this letter will be enclosed with the shipment.

Framatome ANP looks forward to continuing to work with ANL and the NRC on these projects

Very truly yours,


James F. Mallay, Director
Regulatory Affairs

cc: M. J. Billone (ANL)
Project 723