

From: Ralph Meyer —RES
To: Mike Billone —ANL
Date: 1/31/06 2:48PM
Subject: Re: ANL Progress for January 2006

Mike,

In your first sentence, shouldn't you change the word "nonirradiated" to "non-fueled"?

Ralph

>>> Mike Billone <billone@anl.gov> 01/31/06 2:36 PM >>>

We initiated many parallel efforts this month to move equipment for sample preparation and testing of nonirradiated materials away from the AGHCF, both from within the walls and from areas adjoining the AGHCF, because of the severe restrictions placed on what work could be done in and around that facility. We initiated these efforts before the ANL Lab Director's announcement in the Argonne News to ensure that we could continue to generate LOCA and SNF data for this NRC program even if the AGHCF remained off limits to programmatic work. Below are a few highlights:

1. Out-of-cell LOCA Integral Apparatus

Prior to January 13th, we completed a series of tests with as-fabricated Zry-4, ZIRLO and M5. The samples were oxidized at 1200C to 13% and 17% ECR, either quenched at 800C or slow-cooled, and ring compression-tested at 135C. Within data scatter, we could see no effect on ductility of quenching vs. slow-cooling for as-fabricated alloys. The results seem to contradict the JAEA (JAERI) results that it is more embrittling to slow cool than to quench.

During the course of this study, we were surprised to learn that surface scratches and abrasions on one of our alloys reduced the post-quench ductility due to localized formation of cracked monoclinic oxide. We expect that the lower the oxidation temperature, the lower the time to more global breakaway oxidation due to scratches and abrasions. This is food for thought for NRC. The cladding data that NRR is given by the vendors is for belt-polished cladding free of abrasions and surface scratches. There may be some scratching and abrasion during the insertion of the rods through the grid spacers to form the assembly.

The out-of-cell LOCA apparatus has been moved to a non-radiation-controlled area. We need about 3 days for modification of the electrical supply and another week to re-benchmark the whole system. We expect to start generating data by Feb. 13th at the latest. Until we get a supply of prehydrided cladding, we will complete our testing of as-fabricated alloys (10x10 Zry-2, belt-polished 15x15 Zry-4 to compare with poorer results for rough 15x15 Zry-4).

The high-burnup M5 and ZIRLO cladding samples from Studsvik have been successfully unloaded and stored in IML Cell #3. This is the first time that highly contaminated shipping tubes containing high-burnup cladding have been unloaded in the IML. Previously, such cask unloading has always been performed in the Clean Transfer Area of the AGHCF.

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2. Mechanical Properties for LOCA, RIA, and SNF

The old EDM has been removed from IML Cell #3 and the cell has been deconned. Modifications are still being made to the new EDM to adapt it for remote operation. Installation and benchmark-testing of the new in-cell EDM will be completed by Feb. 15th. We have one Robinson axial tension sample (SNF) waiting for completion of gauge machining. Four of the high-burnup ZIRLO samples expected in the next Studsvik shipment are to be machined into axial tension samples and tested for SNF application.

3. SNF

The prehydriding system has been moved from a room (F207) adjoining the AGHCF boundaries to a non-radiation-controlled lab (DL-112) near our LECO hydrogen and oxygen analysis lab (DL-114). This has caused a delay of about one month because certain fixtures and control systems have to be re-installed. The system will be fully operational and benchmarked by March 6th.

The impact tester also had to be moved from F207 for different reasons to the Impact Test Lab (G179) -- a non-radiation-control area. Based on half-time effort on this project, it will be dynamically calibrated and ready for use by the end of February 2006.

The out-of-cell pressurization/laser-welder system has been moved from the AGHCF to DL-114. It will be used in the final fabrication step for prehydrided Zry-4 pressurized tubes, which will then be subjected to slow-cooling from 400C.

4. Implications of January 13th Announcement regarding programmatic work in AGHCF

It is still not clear what we can or cannot do in the AGHCF for the NRC program. There have been phone calls and a letter between NRC and ANL management, which may result in some compromise regarding partial use of the facility.

In the meantime, other options are being explored for defueling three-inch-long segments of Robinson cladding for continuation of high-burnup LOCA and SNF work. A meeting at ANL with BWXT was held and a visit was made to their hot-cell facility in Lynchburg VA. BWXT is interested in doing the defueling for ANL, but there may be contractual and practical issues with this arrangement.

The EPRI-Framatome project, which was to bring high-burnup M5 rods to ANL, involves mechanical properties testing in the IML. The rods are at INL and need to be shipped out of Idaho by about June 2006. Although it is no longer clear that ANL will get the EPRI-Framatome contract, INL has offered to defuel the three-inch-long test samples needed for the EPRI-Framatome project and ship them to ANL. There is also some indication that ANL will still accept the four M5 rods.

CC: Harold Scott