

FUEL FAILURE MANAGEMENT HANDBOOK



“FFMH provides light in the dark”

PEDRO MATA, IBERDROLA GENERACIÓN

When I reached the position of Iberdrola Nuclear fuel manager, one of my most demanding activities was to handle a fuel failure that was identified at the very startup of the plant after Cofrentes #14 outage.

Unfortunately, although we applied all the Cofrentes staff experience in operating with fuel failures, we had to make a midcycle outage to replace the leakers (two leakers were found during the sipping of the core). After this experience, I was going through the different publications, tools, procedures available in the nuclear fuel world that could help us in the management of the fuel failure operation. After a thorough search, I heard about the Fuel Failure Management Handbook (FFMH), developed by ANT Intl and ALARA Engineering, thanks to the Iberdrola participation in the Zirat program, and we decided to purchase the FFMH together with the BWRFuelRelease (BWRFR) code.

I am sorry to say that, unfortunately, the facts showed that our decision of purchasing the FFMH had been very appropriate. Only one month after operating the next Cofrentes cycle (cycle #16) a new leaker was identified in the core.

Nevertheless, at this time the availability of the FFMH and the use of the BWRFR code has helped us to have more detailed information about the fuel leaker (type, burnup) and even about the kind of secondary degradation. The capability of the BWRFR code to estimate the amount of Uranium dissolution has also helped us a lot to take the correct decisions for operating the Cofrentes cycle under fuel leaker conditions.

The FFMH provides in a very structured way, all the information that is needed to understand the different process involved since the leaker appears to the moment when a secondary degradation occurs. Besides this, the BWRFR code is very user friendly: the use and interpretation of the results are quite simple. This has allowed a number of people of the organization to be able to use the code and understand the complex phenomena involved when a fuel leaker occurs at the plant.

I can say, that although the use of the FFMH does not avoid the appearance of leakers, it provides some light in the dark path of the fuel leaker operation management.

ANTI CLOSE UP



Ron Adamson

Antenna: How did you get introduced to the ZIRAT program?

RBA: My initial exposure to ZIRAT was way back in 1998, when I was still with GE Nuclear. Al Strasser asked me to give a lecture describing the axial split-secondary degradation problem in cladding to the ZIRAT 3 US group of utility members. Since our GE Vallecitos group had done a lot of good work in that area, I was pleased to do it. And I noted that the utility people very much appreciated getting a relatively unbiased material performance view. And I liked doing it. So when I retired in 2000 and Peter Rudling asked me to join ZIRAT, I eagerly accepted. Now, six years later I am proud to be working with what I consider to be a “dream team” of experts in the nuclear materials area. At one time we were all competitors, but now we are friends and colleagues.

Antenna: How did you get started as a metallurgical engineer?

RBA: As a youngster I was always interested in science and sports. So when it came time for college my goal was to get a football scholarship at a university with a good engineering school. I decided on the U. of Wisconsin. I started in Mechanical Engineering and discovered metallurgy only in my senior year. Then I did a liquid metal embrittlement thesis for a Masters in Nuclear Engineering and continued with an irradiation effects thesis for a PhD in Metallurgical Engineering. That led me to some basic radiation damage work at Harwell in England and eventually to a real job at GE-KAPL to do irradiation effects studies in zirconium alloys, about which I knew nothing!

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RON ADAMSON CONT.

Then came a really wonderful job at GE Vallecitos Nuclear Center working on a range of nuclear reactor materials issues, mainly concerned with Zircaloy and zirconium.

Antenna: How has the nuclear materials field changed during your career, and how does ZIRAT fit in?

RBA: The challenge and reward of nuclear materials work is that it is all very high tech and uses all the science and engineering disciplines. When I started at Vallecitos, we had the resources to take us through the whole scientific-method sequence. But, alas! the business was losing money. Today the nuclear businesses are making money, but the resources in terms of people and programs are limited. That's where I think ZIRAT comes in. As a dream team we can read and analyze the literature; write "white papers" on special topics of interest; provide training in the basics of material behavior – all areas where commercial organizations no longer have the resources or expertise to do on their own. And we enjoy doing it!

Antenna: You are supposed to be retired. How do you spend your leisure time?

RBA: The ZIRAT work is fun for me. But Alta Jo and I also have a wonderful family who all live within walking distance, and we spend a lot of time together. And I still write and perform folk-blues songs, sing in my church choir, play golf and softball, bike a lot, do medical-bioethics at the local hospital, and travel to Africa as often as possible to join animal research projects. Yes, retirement is good.



More pics from the ZIRAT10 and LCC1 events at www.antinternational.com



NEW LCC NETWORK MEMBER

Welcome Peter

Dr. Peter Ford is a retiree from the General Electric Corporate R & D Center, Schenectady, NY, where he was Manager of the Corrosion Mitigation and Coatings Laboratory. He has served for 4 years on the Advisory Committee for Reactor Safeguards at the NRC.

For the majority of his career he has been involved in the mitigation of environmentally-assisted materials degradation problems in fossil and nuclear power plant.

More info at www.antinternational.com

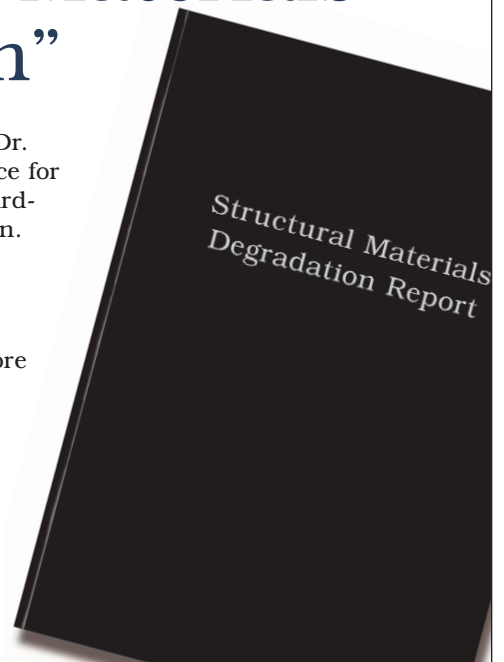
NEW REPORT COMING FEBRUARY 2007

“Structural Materials Degradation”

The new Report will be written by Dr. Peter Ford and will provide guidance for those needing an introduction regarding structural materials degradation.

The content covers the range from basic information to current knowledge. It is a stand-alone Report, but will also act as a primer for more detailed discussions of various degradation modes that will be presented in the annual LCC Conference and reports. The Report is delivered with a CD and a 1/2 day seminar.

Read more at www.antinternational.com



Success for ZIRAT10 and LCC1 seminars

The seminars in Marco Island in the end of January and in Nice a week later were both interesting and successful. A total of 47 customers from 23 utilities or research engineering organisations from Europe and US participated in the two ZIRAT-10 seminars. The two LCC-1 seminars had an audience of totally 29 participants from 13 utilities or research engineering organisations.

Evaluation from the participants at www.antinternational.com

