The Antenna
NEWSLETTER FROM ANT INTERNATIONAL No.21 2012

FEEDBACK ON TAILORED SEMINAR

"A kick start for a new generation of researchers"

Todd Allen obtained his Ph.D. in nuclear engineering from the University of Michigan. His background is in radiation effects and corrosion in nuclear systems. He is the Scientific Director of the Advanced Test Reactor National Scientific User Facility at the Idaho National Laboratory, Director of the Center for Material Science of Nuclear Fuel at INL, and an Associate Professor at the University of Wisconsin.

On may 16–17, The Idaho National Laboratory's Institute for Nuclear Energy, Science & Technology (INEST) hosted a two-day seminar on fuel performance in light water reactors titled "UO_2 & MOX Fuel Performance" led by instructors from ANT International. This seminar was the third in a planned series with previous workshops in 2010 on "Environmentally-Assisted Degradation of Structural Alloys in Light Water Reactors," and in 2011 on "Zirconium-based Alloys in Nuclear Systems." The goal of this seminar was to educate a number of INL staff and junior faculty from around the country on the key degradation issues experience by uranium dioxide used for the fuel pellets in nuclear systems. The goal of this seminar was to reinvigorate interest and help kick start a new generation of researchers targeting better fuel performance in nuclear systems.

Dr. Todd Allen, the Director of the INEST Fuels and Materials program, organized the seminar, which was presented by Mr. Peter Rudling and Dr. Chuck Patterson of ANT International. The topics covered included Fuel Chemistry, Fission Products, Thermal Properties, Physical Properties, In-Reactor Behavior, Improved Pellet Materials-Additives, and Fuel Behavior during Reactivity Initiated Accidents. The seminar finished with Mr. Rudling and Dr. Patterson discussing key research challenges for the participants to study.

The size of the audience was 45 participants with the room size ultimately limited the final attendance numbers with a waiting list of other interested participants. The audience members, who engaged Mr. Rudling and Dr. Patterson with questions during the presentations, provided extremely positive feedback for the instructors and the material presented. The participants were quite pleased with the contents of the workshop.

"Seminar was very informative and relevant to my work. A lot of information was presented and I plan to go slowly through the slides on my own to better understand some of the topics."

"Graphics are very well done – both images and plots. I especially like the diagrams illustrating fuel behaviors. The intro presentations were thorough and good. I liked that the "accident" presentations connected back to the performance presentations."

The Idaho National Laboratory has been extremely pleased with the interactions with ANT and plans to continue these types of workshops. Currently there are a number of collaborative research projects ongoing that were a direct result of the 2010 and 2011 workshops and similar results are anticipated in 2012.

Editor & publisher: Peter Rudling

Environmental Degradation Reports

Reports that inform, educate and find answers to structural material issues affected by the water or steam environment in LWRs

ANT INTERNATIONAL has published three Reports on environmentally-assisted degradation in:

1) Carbon and Low-Alloy Steels,
2) Stainless Steels,
3) Nickel base Alloys.

The Reports are authored by ***Dr. Peter Ford***, ***Dr. Peter Scott*** and ***Dr. Pierre Combrade***.

Environmentally-assisted degradation of structural materials has had a significant effect on the economics, capacity factors and, in some cases, the safety of water-cooled nuclear reactors. The phrase "environmentally-assisted degradation" covers a wide range of phenomena spanning general corrosion, localized corrosion, stress corrosion, embrittlement (due to, for example, hydrogen and/or neutron irradiation), fatigue, etc. The scope of the Reports is confined to those phenomena that are affected by the water or steam environment relevant to water cooled nuclear reactors.

Up to now, the management approach has been largely reactive, with mitigation actions being developed and deployed after the problem was first observed in operating plant. A more efficient management approach is, however, to predict the degradation before it has an impact on reactor operations. Such an approach requires life prediction capabilities that are qualified against data both from operating experience (in nuclear plant and other industries) and from laboratory observations. Such life prediction capabilities are described in these Reports by organizing the discussion of each of the degradation modes in the Reports in terms of past operating experience, the known role of the various material, environmental and mechanical system parameters that control the extent of degradation at a given time and, finally, a discussion of the capability for predicting future behavior.

The Reports cover the range from basic information to current knowledge and they are written and explained in such a way that those not familiar with the topic can easily follow the report, find and grasp the appropriate information. This means that the Report could be used by your organisation in the training of internal staff with or without additional assistance from ANT International staff.

To browse through the Reports and view the content lists, please click on the Report titles:

Environmentally-Assisted Degradation of Carbon and Low-Alloy Steels

Environmentally-Assisted Degradation of Stainless Steels in LWRs

Environmentally-Assisted Degradation of Nickel base Alloys in LWRs

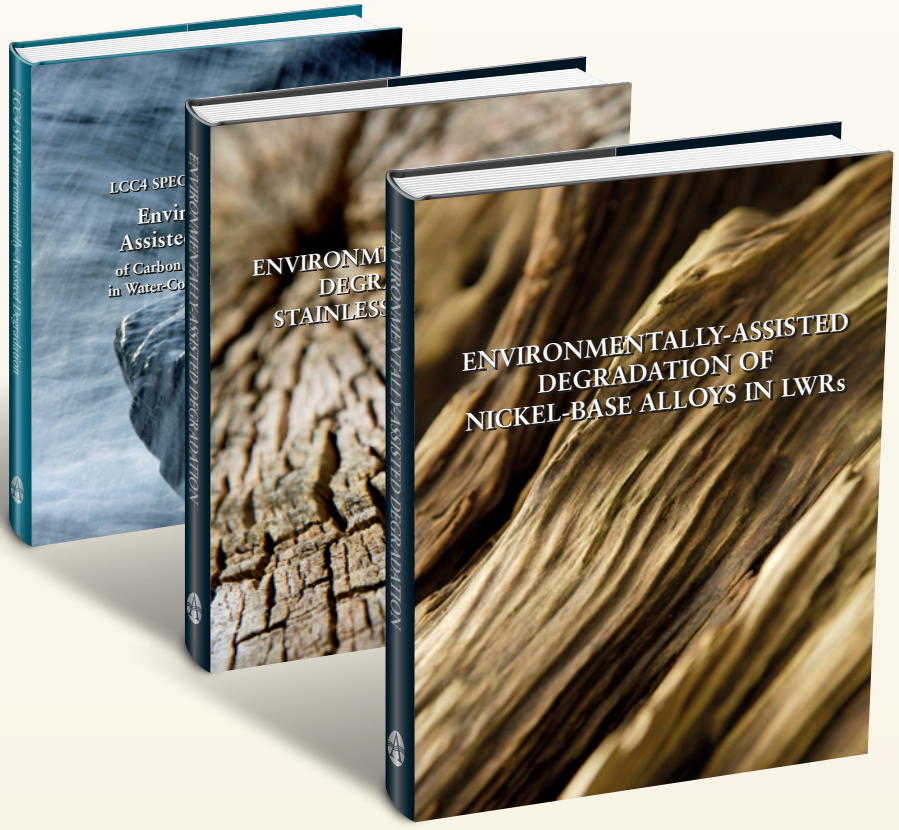
Tailored Seminars related to these Reports are available from ANT International and the authors.

Please click on the links below to read feedback from previous Seminars:

Idaho National Laboratory, USA

NPP Borssele, Netherlands

Cofrentes NPP, Spain



For further questions or an offer, please contact Peter Rudling; peter.rudling@antinternational.com

Spent Fuel Management

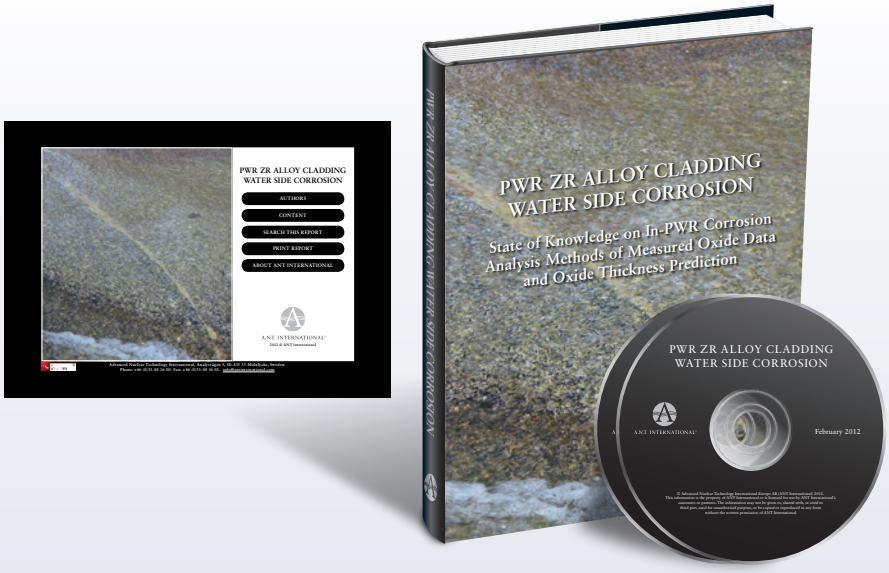
ANT INTERNATIONAL provides with the ZIRAT program a unique product. The expert network does not only cover the subjects like cladding tube and fuel during reactor operation but also during storage thus taking into account e.g. the water chemistry in case of wet storage or the stress and temperature effects of spent fuel during cask loading and dry storage. As the latest research results are compiled in the Annual Reports it is a great way to get informed on what topics are currently under discussion.

The holistic approach, the knowledge of the latest internationally published results in the nuclear field combined with the specialist knowledge and experience of the ZIRAT team members who have worked on the nuclear field for several years is the basis for the conduction of tailored seminars. This approach is beneficial for beginners as well as for those who want to deepen their knowledge on a certain aspect. Since 2009 onwards Peter Rudling and Friedrich Garzarolli conducted 1-day seminars at GNS which covered processes during dry storage thereby dealing with the mechanical behavior of fuel assemblies, corrosion and hydrogen pickup mechanisms, oxide thickness at discharge burnup and potential failure mechanisms of fuel rods. Providing information on the issue of interest to our organization guarantees the seminar success. Finally, the direct dialogue with the experts is of great importance for the effectiveness of the progress of knowledge. Again, participants from 2011 recommended to continue this series of tailored seminars.

The next seminar is scheduled for September 2012.

Wilhelm Graf
Director, Spent Fuel Management Department
GNS Gesellschaft für Nuklear-Service mbH
Germany

NEW HANDBOOK



The newly published Handbook – PWR Zr Alloy Cladding Water Side Corrosion (PZAC) can now be ordered.

Please find more information about this Report ***here***

For further questions or an offer, please contact Peter Rudling; peter.rudling@antinternational.com

NEW EDUCATIONAL PROGRAMME

ANT International Academy

ANT INTERNATIONAL has launched a post university education, ANT International Academy (ANTIA).

The objective of the ANTIA Programme is to provide engineers and managers the necessary background information to:

1) Increase the understanding of materials and reactor water behaviour related to successful core operation while keeping personnel radiation exposure low and,
2) Ensure the integrity of structural materials

The ANTIA Educational Programme will also provide useful background for participants in the LWR Chemistry and Component Integrity (LCC) and Zirconium Alloy Technology (ZIRAT) Seminars to better understand the Seminar presentations. The schedule in the LCC and ZIRAT Seminars are tight and therefore the background given for each topic is limited.

The ANTIA Programme covers four different competency areas:

- Fuel and Fuel Assembly Materials ***Content list***
- Structural Material Degradation ***Content list***
- BWR Plant Chemistry ***Content list***
- PWR Plant Chemistry ***Content list***

The deliverables in each of the four Educational Programmes are:

- ANT International will send a binder and a searchable CD with all the necessary background information to each participant prior to the Seminar
- Before the Seminar, the presentation material will be made available to the participants
- A one-week Seminar provided by the ZIRAT/IZNA and LCC Experts (see below)
- A certificate will be issued to each participant after the Seminar

The four different Seminars are scheduled during the week February 25–March 1, 2013 at hotel Meliá Sevilla in Seville, Spain. This is the same hotel were the Zirconium Alloy Technology (ZIRAT) and LWR Chemistry and Component Integrity (LCC) will take place the week after, i.e., March 4–6, 2013.

For further questions or an offer, please contact Peter Rudling; peter.rudling@antinternational.com

EXISTING REPORTS OF GREAT VALUE

Corrosion and hydrogen pick-up

Reports from ANT International may be used for education or help to resolve current Issues. One topic that is of great interest to the nuclear industry is corrosion and hydrogen pickup in Zr Alloys.

ANT International has published several Reports on this topic:

Water Chemistry and CRUD Influence on Cladding Corrosion

The Effects of Zn Injection (PWRs and BWRs) and Noble Metal Chemistry (BWRs) on Fuel Performance

Corrosion of Zirconium Alloys

Corrosion of Zr-Nb Alloys in PWRs/VVERs

Corrosion Mechanisms in Zirconium Alloys

By clicking on the Report titles you will be able to access samples of them and view the content list.

For further questions or an offer, please contact Peter Rudling; peter.rudling@antinternational.com

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