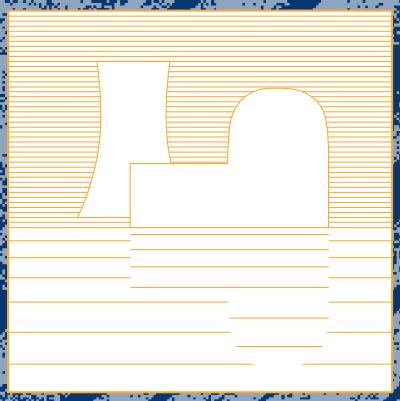
Ninth International Conference on Environmental Degradation of Materials in Nuclear Power Systems-Water Reactors



AUGUST 1-5, 1999

Newport Beach Marriott Hotel & Tennis Club
Newport Beach, California

ADVANCE PROGRAM

REGISTRATION AND HOUSING FORMS ENCLOSED

SPONSORED BY:

AMERICAN NUCLEAR SOCIETY
NATIONAL ASSOCIATION OF CORROSION ENGINEERS
THE MINERALS, METALS & MATERIALS SOCIETY

CONFERENCE TOPICS

- PWR Primary - Mechanisms; Chemistry and Failure Analysis; Hydrogen Effects & Microstructure; Crack Growth & Creep
- PWR Secondary - System Definition; Cracking Response; Mechanisms
- BWR - Cracking Response; Mechanism/Life Extension; System Definition; Mitigation;Life Extension
- Low Alloy Steel - Embrittlement; EAC & Deformation
- Regulation Aspects
- Welding/ Processing
- Radiation Effects on Stress Corrosion Cracking
- Radiation Effects on Deformation and Swelling
- Radiation Effects on Microstructure and Microchemistry
- Zircaloy

Ninth International Conference on Environmental Degradation of Materials in Nuclear Power Systems-Water Reactors

ORGANIZING COMMITTEE

Conference Organizers

Steve Bruemmer
Pacific Northwest National Laboratory

Gary Was
University of Michigan

Peter Ford
General Electric Corporate Research & Development Center

Members

Geoff Airey
Nuclear Electric Ltd

Peter Andresen
General Electric Corporate Research & Development Center

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Ed Simonen
Pacific Northwest Laboratory

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AECL Research, Station 61

Charlie Thompson
Knolls Atomic Power Labs

Toshio Yonezawa
Mitsubishi Heavy Industries, Ltd.

SYMPOSIUM CO-SPONSORS

The Minerals, Metals & Materials Society is the administering sponsor Society for the Conference. The event is being co-sponsored by the American Nuclear Society and the National Association of Corrosion Engineers.

DATES AND LOCATION

The Ninth International Conference on Environmental Degradation of Materials in Nuclear Power Systems - Water Reactors will be held August 1-5, 1999 at the Newport Beach Marriott Hotel & Tennis Club, Newport Beach, California, USA.

TECHNICAL EMPHASIS

The Ninth International Conference on Environmental Degradation of Materials in Nuclear Power Systems - Water Reactors will commence at 8:00 AM on Monday, August 2, 1999, Sessions will be held at the Newport Beach Marriott Hotel & Tennis Club.

Environmentally induced materials problems cause a significant portion of nuclear power plant outage time and are of great economic and safety concern especially as the age of light water reactors gradually increases. The purpose of this conference is to foster the exchange of ideas about such problems and their remedies in nuclear power plants using water coolant.

The conference will follow much the same format of the previous eight meetings in the series. Scientists and engineers concerned with the environmental degradation processes (corrosion, mechanical and radiation effects) will exchange views and present their latest results through a combination of invited and contributed presentations. A new topic at the Ninth Conference will be half-day sessions devoted specifically to life extension/relicensing issues that will be of increasing relevance as the world's reactor fleet ages. The conference will be of interest to utility engineers, reactor vendor engineers, plant architect engineers, and consultants involved in design, construction, and operation of water reactors, as well as researchers concerned with the fundamental nature of materials degradation.

LETTERS OF INVITATIONS

The Organizing Committee will issue letters of invitation to individuals requiring this service. Such letters though, do not commit the Organizing Committee nor TMS to providing financial support. Fax, E-mail or mail request for a letter of invitation to:

Michael Packard, Manager, Meeting Services
TMS, Meeting Services Department
184 Thorn Hill Road, Warrendale, PA 15086, USA

Fax: 724-776-3770; E-mail: packard@tms.org

AT-MEETING PROGRAM & CONFERENCE PROCEEDINGS

A complete program with abstracts of papers to be presented will be distributed to all registrants upon registration. Proceedings, containing all the papers presented at the meeting, are scheduled for publication by December 1999. This will enable critical discussions that take place during individual sessions to be included.

POLICY ON AUDIO/VIDEO RECORDING OF TECHNICAL PAPER PRESENTATIONS/SESSIONS

The Minerals, Metals & Materials Society (TMS) reserves the right to any audio and video reproduction of all presentations at every TMS sponsored meeting. Recording of sessions (audio, video, still photography, etc.) intended for personal use, distribution or copyright without the express written consent of TMS and the individual authors is strictly prohibited. Contact the TMS Technical Program Department in advance to obtain a copy of the waiver release form.

SOCIAL PROGRAMS

Various social functions have been planned to supplement the formal technical program, including the following:

Sunday evening

Welcoming Reception .. 5:30 PM - 7:00 PM

Wednesday evening

Conference Banquet ..... 6:30 PM - 9:30 PM

Tickets for the banquet for students and accompanying persons can be purchased on the registration form on page 15. The Welcome Reception is included in the fee for students and accompanying persons. A full slate of accompanying person activities and tours are described later in this mailer. In addition, organized golf and tennis activities are planned if sufficient attendee interest is generated. Please indicate your preference on the PRA registration form. Deadline to sign up for the golf and tennis activities is **July 12, 1999** on the PRA registration form.

Boats from all over the world drop their anchors in beautiful Newport Harbor.

Photo courtesy of Lawrence Crandall Photography.

For a "quick" bite to eat, lunch packages can be purchased for Monday, August 2, 1999 through Wednesday, August 4, 1999. The lunches will be available starting at 12:00 Noon. To order a lunch package, refer to the registration form on page 15 of this mailer.

CONFERENCE REGISTRATION

Full conference registration fee includes attendance at all technical sessions, welcoming reception, Conference Banquet, coffee breaks and a bound copy of the conference proceedings. Extra copies of the conference proceedings can be ordered on the registration form on page 15 of this mailer.

The Ninth International Conference on Environmental Degradation of Materials in Nuclear Power Systems - Water Reactors attendees are encouraged to register in advance to avoid delays on-site. Advance registration and fee must arrive at TMS on or before **July 12, 1999** to qualify for a $100 discount off of the on-site registration fee. Registration forms received after **July 12, 1999** will be charged the on-site fee.

To register in advance and qualify for the advance registration savings, complete the enclosed Registration Form and mail or fax with payment to:

TMS, Environmental Degradation Registration
184 Thorn Hill Road, Warrendale, PA 15086

Fax: 724-776-3770
E-mail: csc@tms.org

Registration can be received 24 hours a day via the Ninth International Conference on Environmental Degradation of Materials in Nuclear Power Systems-Water Reactors Home Page, on the World Wide Web at http://www.tms.org/Meetings/Specialty/Nuclear-IX/Nuclear-IX.html. TMS OnLine also provides detailed information on this and all TMS-sponsored conferences.

On-Site Conference Registration Hours:

Sunday, August 1, 1999 ..... 1:00 PM - 7:00 PM
Monday, August 2, 1999 ..... 6:30 AM - 5:00 PM
Tuesday, August 3, 1999 ..... 6:30 AM - 5:00 PM
Wednesday, August 4, 1999 ..... 6:30 AM - 5:00 PM
Thursday, August 5, 1999 ..... 6:30 AM - 12:00 PM

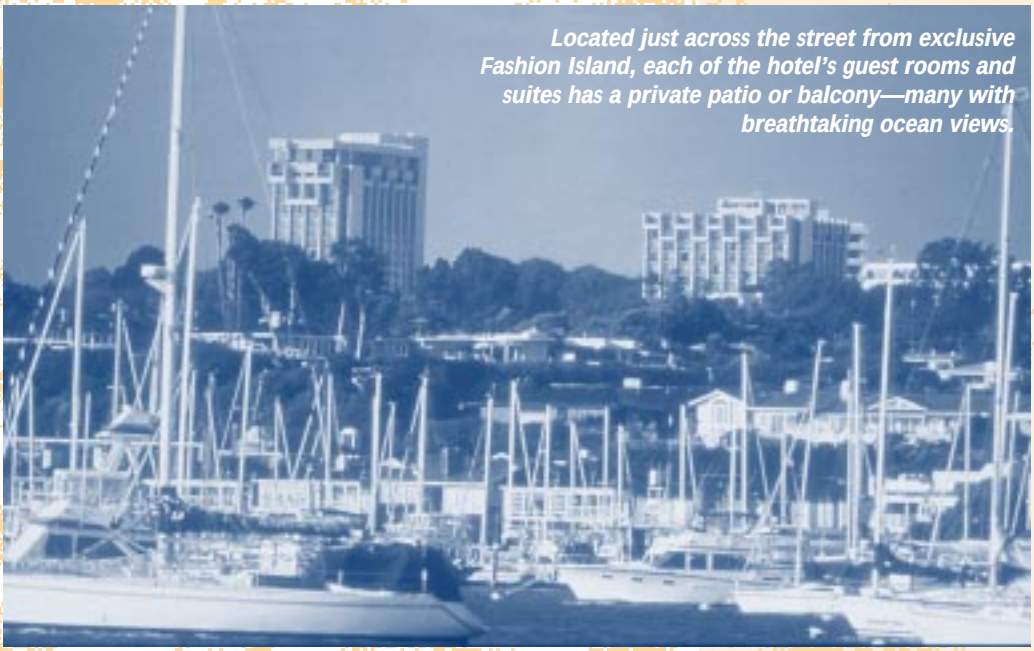
HOUSING ACCOMODATIONS

The Headquarter Hotel and site for the Ninth International Conference on Environmental Degradation of Materials in Nuclear Power Systems-Water Reactors is the Newport Beach Marriott Hotel & Tennis Club, Newport Beach, California. The Hotel offers resort accommodations with large rooms, which are specifically designed for the business traveler.

As a special consideration for those attendees who may wish to take advantage of a few extra days in the Newport Beach area, the special conference rate is offered 3 days prior and 3 days following the symposium dates, based on availability.

Please refer to the housing form on page 17 for reservation information.

For recreation and leisure, the Hotel has two outdoor pools and a whirlpool, an exercise room and 8 lighted tennis courts.



Located just across the street from exclusive Fashion Island, each of the hotel's guest rooms and suites has a private patio or balcony—many with breathtaking ocean views.

Near the hotel is a jogging trail, golf course and the beach! Fashion Island, which is located next to the Marriott, is a beautiful Mediterranean-style outdoor center, overlooking the glistening Pacific Ocean, which encompasses 200 stores, over 40 restaurants, 2 food courts, a 7-screen cinema and a Farmers Market. Weekly outdoor music concerts are also held at Fashion Island.

There are different atmospheres for all different tastes at the Newport Beach Marriott & Tennis Club. *JW's* California Grill specializes in fresh seafood and American cuisine for breakfast, lunch and dinner. The *Pool Bar* serves sandwiches and snacks for lunch and the *View Lounge & Sushi Bar* offers cocktails, snacks, appetizers and sushi. These restaurants, along with the extensive selection within the Fashion Island complex, give many options for dining within easy walking distance.

Hotel reservations must be received by the Marriott cut-off date of July 12, 1999. Due to the fact that this is a very busy time for all hotels, please be sure to make your reservations as early as possible. After the **July 12, 1999** cut-off date, the special conference rate may not be available. Check in time is time is 4:00 PM. Check out time is 12:00 Noon.

Mail or fax the enclosed housing form directly to:

Newport Beach Marriott Hotel & Tennis Club
900 Newport Center Drive
Newport Beach, CA 92660

Fax: 949-640-4918

CONFERENCE LOCATION

Newport Beach is a harbor city situated on the ocean between Los Angeles and San Diego. A year-round Mediterranean climate should produce sunny days and pleasant nights in early August with high temperatures near 80 degrees Fahrenheit. The area boasts countless outdoor activities, renowned theme parks, local artist communities, world-class dining and shopping, and much more. The conference hotel is located less than a mile from the ocean and is just 10 minutes from the John Wayne/Orange County Airport and about 55 minutes by car from the Los Angeles International Airport.

AMERICANS WITH DISABILITIES ACT

TMS strongly supports the Federal Americans with Disabilities Act (ADA) which prohibits discrimination against, and promotes public accessibility for those with disabilities. In support of this act, we ask that those attendees requiring specific equipment or services contact the TMS Meeting Services Department to advise specific needs in advance.

ACCOMPANYING PERSONS TOURS

The Minerals, Metals & Materials Society (TMS) has arranged customized tours for attendees and/or accompanying persons during the Ninth Environmental Degradation of Materials in Nuclear Power Systems Conference. To register, please complete the reservation form on page 19 and return it to PRA Destination Management. All tour tickets will be held in your name, for pickup at the tour desk in the registration area at the meeting. Please note that reservations will be handled on a first-come basis; therefore, attendees wishing to participate are encouraged to reserve early in order to assure availability of the tours.

PRA - Destination Management
150 Paularino, Suite 155
Costa Mesa, CA 92626

Phone: (714) 755-1500
Fax: (714) 755-1511

The deadline for pre-registration for the tour program is **July 12, 1999**. Tours will not be scheduled unless sufficient pre-registration is received. Therefore, please make your reservations early.

Staff from PRA Destination Management will be available in the registration area during the following times:

Sunday, August 1, 1999 ..... 4:00 PM - 6:00 PM
Monday, August 2, 1999 ..... 8:00 AM - 12:00 Noon
Tuesday, August 3, 1999 ..... 8:00 AM - 12:00 Noon
Wednesday, August 4, 1999 ..... 8:00 AM - 9:30 AM

■ ACCOMPANYING PERSONS TOUR 1

BEST OF NEWPORT

SUNDAY, AUGUST 1, 1999

$40.00 PER PERSON

12:00 PM - 4:30 PM

LIMIT 45 PERSONS

Your day will start with a delightful one-hour cruise of Newport Harbor. One of the largest natural harbors in the United States and anchorage for 12,000 pleasure crafts, Newport Harbor is home for yacht clubs, beachfront mansions, and sportfishing fleets. Film crews in the silent screen era used its beautiful coastline to double as a Caribbean pirate's hidden cove. Today, Newport is one of California's busiest harbors, filled with dozens of colorful sailboats and majestic yachts.

Time has been allotted for exploring Balboa Island. This quaint and charming island community located in Newport Harbor is a popular attraction for visitors and residents alike. Best seen on foot, this picturesque island is home to more than 70 gift shops, galleries and restaurants.

Your final stop will be Roger's Gardens. Perched high on a hilltop overlooking the coastline, Roger's Gardens is a 7-acre landscape display, a retail nursery, and interior design studio all rolled into one. Roger's Gardens employs a friendly staff, well-versed in any phase or style of gardening.

Tour features:

- One-hour scenic tour of Newport Harbor aboard the Pavilion Paddy Boat
- Free time for exploring in Balboa Island
- Free time for shopping and browsing at Rogers Gardens
- Uniformed PRA staff to assist guests and coordinate activity
- Transportation via deluxe, air-conditioned motorcoach
- Please note, this tour consists of a lot of walking

■ ACCOMPANYING PERSONS TOUR 2

THE MAGIC KINGDOM

MONDAY, AUGUST 2, 1999

$78.00 PER PERSON

9:00 AM - 5:00 PM

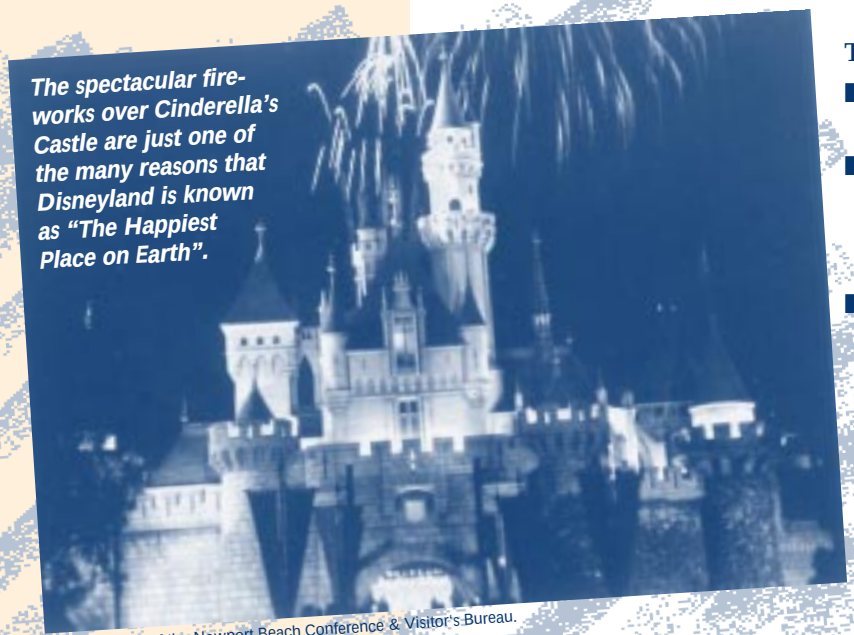
LIMIT 45 PERSONS

Known as "the happiest place on earth," Disneyland is home to such traditional characters as Mickey and Minnie Mouse, as well as mega-stars from Aladdin and Beauty and The Beast. Spend the day meeting these endearing characters experiencing a variety of animated rides, nonstop attractions and exhibits that appeal to visitors of all ages!

Main Street 1890 in Home Town, U.S.A. is your first stop in the park. Here you can relive the days of horse-drawn streetcars, barbershop quartets, ice cream parlors and silent movie houses.

Then, see your life splash before your eyes as you plunge five stories straight down Splash Mountain. Sail away with the raucous Pirates of the Caribbean. Strap yourself in for the thrills and spills of Space Mountain. Experience the joy of childhood as you stroll through Disneyland's Toon Town where you can interact with everything from talking manholes and rubber fire hydrants to dancing dishes and spinning flowers. Be sure to hop on a "doom buggy" for 999 happy haunts in the Haunted Mansion. And please don't miss Disneyland's newest attraction . . . Swirling rivers of molten lava. Deadly booby-traps. Swarms of snakes, bugs and rats. Poison darts that part your hair. A 50-ton rolling boulder of bone-crushing granite, with your name on it. And a trusty troop carrier to get you through it all. Ride the fine line between fright and fun on The Indiana Jones Adventure.

Enjoy the Disney magic!



The spectacular fireworks over Cinderella's Castle are just one of the many reasons that Disneyland is known as "The Happiest Place on Earth".

Photo courtesy of the Newport Beach Conference & Visitor's Bureau.

Tour features:

- One-day admission to Disneyland
- Uniformed PRA staff to assist guests and coordinate activity
- Transportation by deluxe, air-conditioned motorcoach

■ ACCOMPANYING PERSONS TOUR 3

CALIFORNIA OLD AND NEW

TUESDAY, AUGUST 3, 1999

$53.00 PER PERSON

9:00 AM - 3:00 PM

LIMIT 45 PERSONS

Experience the rich history and local culture of the Southern California Riviera!

The artist colony of Laguna Beach is a shopper's paradise with shopping concentrated in a charming area along Pacific Coast Highway on Forest Avenue, near Main Beach. Acquire a very special insight into the world of art as you explore some of the city's premier galleries and studios where you'll find art to suit every taste and decor.

Delight in the open-air bazaar at the Pottery Shack offering bargain shopping with an ocean view. Opened during the depression year of 1936 by two brothers, the original friendly charm continues to draw customers from around the world.

Your next stop is lunch at El Adobe. Lovers of Mexican food will enjoy El Adobe restaurant, whose original building dates from 1778. This historic location, once a stagecoach stop on "El Camino Real" (the King's Highway), remains a comfortable wayside inn, enriched with old-fashioned California hospitality.

Following lunch your guests will visit the Mission San Juan Capistrano, founded by Father Junipero Serra in 1776, the seventh in the chain of Franciscan missions built along the California coast. Mission San Juan Capistrano, the most romantic and famous of California's 21 missions is also famous for the annual migration of the swallows to this site on March 19th.

Tour features:

- Scenic drive into Laguna Beach
- Visit to various art galleries
- Visit to the Pottery Shack
- Free time for browsing and shopping in Laguna Beach
- Lunch at El Adobe
- Docent-guided tour of the Mission San Juan Capistrano
- Uniformed PRA staff to assist guests and coordinate activity
- Transportation by deluxe, air-conditioned motorcoach

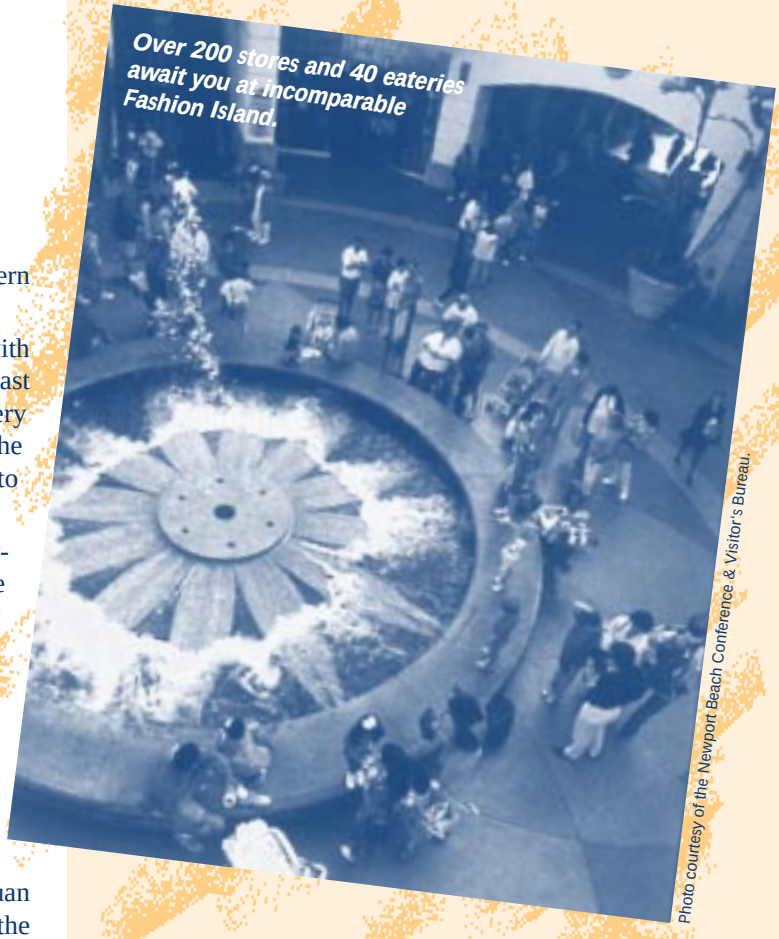


Photo courtesy of the Newport Beach Conference & Visitor's Bureau.

■ ACCOMPANYING PERSONS TOUR 4

PAINTING LESSONS

WEDNESDAY, AUGUST 4, 1999

$44.00 PER PERSON

9:00 AM - 11:30 AM

LIMIT 35 PERSONS

Join a local artist at the hotel for a presentation and casual, hands-on painting lesson. You will learn how to simplify complicated artist techniques and procedures resulting in your very own masterpiece. Come develop the spirited use of color and cultivate your own style. It's easier than you think!

Lesson features:

- Two and one-half hour presentation/painting instruction with local artists at the hotel
- Art supplies for guests to paint
- Painting smock for each guest
- Uniformed PRA staff to assist guests and coordinate activity

BWR: Session I - Cracking Response

Monday 8:00 AM - 12:00 PM
August 2, 1999

Session Chairs: P. L. Andresen, GE CRD, USA; C. Jansson, Vattenfall, Sweden

IGSCC in Stabilised Stainless Steels under BWR Conditions, Lab and Field Experience: *J. Hickling*[1]; P. L. Andresen[2]; H. Hoffman[3]; U. Ilg[4]; V. Maier[5]; O. Wachter[6]; M. Widera[7]; [1]Corrosion & Materials Consultancy, Hirtenweg 16, Taufkindnen D-82024 Germany; [2]General Electric Corporate Research and Development Center, One Research Circle, Bldg. K-1 3A39, Schenectady, NY 12309 USA; [3]VBG; [4]EnBW; [5]BAG; [6]PE; [7]RWE

Intergranular Stress Corrosion Cracking Unsensitized Stainless Steels in BWR Environments: *T. M. Angeliu*[1]; P. L. Andresen[1]; J. A. Sutliff[1]; R. M. Horn[1]; [1]General Electric Corporate Research and Development, Bldg. K-1, Rm. 3A-51, 1 River Rd., Schenectady, NY 12301 USA

SCC Testing and Data Quality Consideration: *P. L. Andresen*[1]; [1]General Electric Corporate Research and Development Center, One Research Circle, K1, -3A37 Room 3A39, P.O. Box 8, Schenectady, NY 12309 USA

Stress Corrosion Cracking of Sensitized Type 304 Stainless Steel in 288°C Water: A Five Laboratory Round Robin: *Peter L. Andresen*[1]; Karen Gott[2]; J. Larry Nelson[3]; [1]General Electric Corporate Research and Development Center, One Research Circle, Rm. 3A39, Schenectady, NY 12309 USA; [2]Swedish Nuclear Power Inspection, Klarabergsviadukten 90, Stockholm S-10658 Sweden; [3]EPRI, 3412 Hillview Ave., Palo Alto, CA 94303 USA

Failed Components from the Ringhals 1 (BWR) Steam Driers: *Kjell Norring*[1]; Jan Lagerstrom[2]; Lars Storm[3]; Kurt Norrgard[1]; Goran Embring[2]; Mats Olmeby[2]; [1]Studsvik Material AB, Nykoping SE-61182 Sweden; [2]Vattenfall AB Ringhals, SE-43022, Varobacka Sweden; [3]ABB Atom AB, SE-72163, Vasteras Sweden

Stress Corrosion Cracking of Stabilized Austenitic Stainless Steels in Various Types of Nuclear Power Systems: *Markus O. Speidel*[1]; Ruth Magdowski[1]; [1]Swiss Federal Institute of Technology ETH, Institute of Metall., Zurich CH-8092 Switzerland

Initiation of Stress Corrosion Cracking in Alloys 600 and 182: *Anders Jenssen*[1]; Margareta Stigenberg[1]; Lars G. Ljungberg[1]; [1]ABB Atom, Nuclear Sys. Div., SE-721 63, Västerås Sweden

The Electrochemical Corrosion Potential and Stress Corrosion Cracking of 304 Stainless Steel under Low Hydrogen Peroxide Concentrations: *Yoichi Wada*[1]; Masahiko Tachibana[1]; Atsushi Watanabe[1]; Naohito Uetake[1]; Shunsuke Uchida[1]; [1]Hitachi, Ltd., Power & Indust. Sys. R&D Div., 7-2-1 Omikia, Hitachi, Ibaraki 319-1221 Japan

Crack Growth of Stabilized Steel in O_2-containing High Temperature Water; Influence of Environment and Materials Conditions: *R. Kilian*[1]; U. Eberie[2]; G. Brummer[3]; H. Hoffman[4]; U. Ilg[5]; V. Maier[6]; M. Wachter[7]; [1]Siemens AG. KWU. NBTW, Kembrennstoff-Kreislauf, Hammerbacherstr 12&14, Postfach 3220, Erlangen D-91058 Germany; [2]Siemens AG; [3]HeW; [4]VGB; [5]ENBW; [6]BAG; [7]RWE

PWR Primary: Session I - Mechanisms

Monday 8:00 AM - 12:00 PM
August 2, 1999

Session Chairs: G. Airey, British Energy, UK; C. Thompson, KAPL, USA

SIMS Examination of Steam Generator Tubing for Evidence of Internal Oxidation: *T. S. Gendron*[1]; S. J. Bushby[1]; I. J. Muir[1]; [1]Atomic Energy of Canada, Ltd., Station 61, Chalk River Laboratories, Chalk River, Ontario K0J1J0 Canada

Insights into Crack Growth Mechanisms from Analytical Transmission Electron Microscopy of SCC Crack Tips: *L. E. Thomas*[1]; S. M. Bruemmer[2]; [1]Washington State University, School of Mech. and Mats. Eng., Pullman, WA 99164-2920 USA; [2]Battelle Pacific Northwest National Laboratory, P.O. Box 999, Mail Bin 16, Richland, WA 99352 USA

Comparison of Hydrogen Effects on Alloy 600 and 690: *H. Hanninen*[1]; [1]Helsinki University of Technology, Laboratory of Engineering Materials, P.O. Box 4200, TKK FIN-02015 Finland

Hydrogen Effects on PW SCC Mechanisms in Monocrystalline and Polycrystalline Alloy 600: *T. Magnin*[1]; F. Foct[2]; O. DeBouvier[2]; D. Noel[2]; [1]Ecole des Mines; [2]EDF, R&D Division, Mats. Studies Dept., Les Renardleras, Moret sur Loing Cedex 77818 France

Methodology to Understand the Mechanisms of PWSCC: *T. Yonezawa*[1]; [1]Mitsubishi Heavy Industries, Ltd., Takasago R&D Center, 2-1-1, Shinhama, Arai, Takasago, Hyogo Pref. 676 Japan

SCC in Upper Bundle of OTSG Steam Generators and Approaches to Mechanistic Interpretations: *R. W. Staehle*[1]; Z. Fang[1]; [1]University of Minnesota, Dept. of Chem. Eng. and Mats. Sci., Corrosion Center

An Overview of Internal Oxidation as a Possible Explanation of Intergranular Stress Corrosion Cracking of Alloy 600 in PWRs: *P. M. Scott*[1]; [1]Framatome, Tour Fiat, 1 Place de la Coupole, Paris - La Defense, Cedex 16 92804 France

Measurement of the Fundamental Parameters for the Film-Rupture/Oxidation Mechanism: *J. S. Fish*[1]; S. A. Attanasio[1]; D. S. Morton[1]; P. M. Rosecrans[1]; W. W. Wilkening[1]; T. M. Angeliu[2]; [1]Lockheed Martin Corporation, P.O. Box 1072, Schenectady, NY 12301 USA; [2]General Electric Corporate Research and Development Center, P.O. Box 8, Schenectady, NY 12309 USA

BWR: Session II - Mechanism/Life Extension

Monday 1:30 PM - 5:30 PM
August 2, 1999

Session Chairs: R. N. Horn, GE Nuclear, USA; G. Brummer, HeW, Germany

Effect of Stress Biaxiality on SCC Growth Rate in Oxygenated High Temperature Water: *T. Suzuki*[1]; M. Itow[2] [1]TEPCO R&D; [2]Toshiba R&D

Prediction of Environmentally Assisted Cracking and its Relevance to Life Management/Relicensing of BWRs: *F. P. Ford*[1]; P. L. Andresen[1]; T. M. Angeliu[1]; H. D. Solomon[1]; R. N. Horn[2]; R. Cowan[2]; [1]General Electric Corporate Research and Development Center, P.O. Box 8, Schenectady 12301 NY; [2]General Electric Nuclear Energy

Prediction and Mitigation of Cracking in BWR Core Components: *P. L. Andresen*[1]; F. Peter Ford[1]; R. N. Horn[1]; T. M. Angeliu[1]; [1]General Electric Corporate Research and Development Center., One Research Circle, Rm. 3A39, Bldg. K-1 3A39, Schenectady, NY 12309 USA

Stress Corrosion Cracking Initiation in Austenitic Stainless Steel in High Temperature Water: *Karel Matocha*[1]; J. Wozniak[1]; [1]Vitkovice, J.S.C., Research and Development Div., Pohranicni 31, Ostrava CR

Effects of Acceleration Factors on the Probability Distribution of Stress-Corrosion Crack Initiation Life for Alloys 600, 182, and 82 in High-Temperature, Water Environment: *Masatsune Akashi*[1]; Guen Nakayama[1]; [1]Ishikawajima-harima Heavy Industries Co. Ltd., IHI/Research Institute, 3-1-15 Toyosu, Koloku, Tokyo 135-8732 Japan

The Expected Range in Stress Corrosion Crack Growth Rate Data: *Ernest D. Eason*[1]; [1]Modeling and Computing Services, 6560 Gunpark Dr., Suite B, Boulder, CO 80301 USA

Modeling Noble Metal Coatings for Hydrogen Water Chemistry in BWRs: *D. D. Macdonald*[1]; I. I. Balachov[1]; [1]SRI International, Pure and Applied Phys. Sci. Div., Menio Park, CA 94205 USA

The Prediction of Integral Damage Functions of IGSCC in BWR Primary Circuits: *D. D. Macdonald*[1]; I.l Balachov[1]; [1]SRI International

PWR Primary: Session II - Chemistry and Failure Analysis

Monday 1:30 PM - 5:30 PM
August 2, 1999

Session Chairs: P. M. Scott, Framatome Tour Fiat, Paris - La Defense, Cedex 16 92804 France; T. Yonezawa, Mitsubishi Heavy Industries, Takasago R&D Center, Takasago Japan

Effect of Water Chemistry on Environmentally Assisted Cracking in Alloy 600 in Simulated Primary Side PWR Environments: *Per Lidar*[1]; Martin König[1]; Jan Engström[2]; Karen Gott[3]; [1]Studsvik Material AB, Corrosion and Crack Growth, Nykoping SE-611 82 Sweden; [2]Vattenfall Energisystem AB, P.O. Box 528, Vällingby SE-162 16 Sweden; [3]SKI, Stockholm SE-106 58 Sweden

PWSCC of Alloy 600: A Parametric Study: *C. Soustelle*[1]; M. Foucault[1]; A. Gelpi[1]; P. Combrade[1]; T. Magnin[2]; [1]Framatome, Tour Fiat, 1 Place de la Coupole, Paris -La Defense, Cedex 16 92084 France; [2]Ecole des Mines de Saint Etienne France

Multivariable Analysis of the Effects of Li, H_2 and pH on PWR Primary Water Stress Corrosion Cracking: *E. D. Eason*[1]; A. A. Merton[1]; J. E. Wright[1]; [1]Modeling & Computing Services, 6560 Gunpark Dr., Suite B, Boulder, CO 80301 USA

The Effect of Primary Coolant Zinc Additions on the SCC Behaviour of Alloy 600 and 690: *M. G. Angell*[1]; S. J. Allen[1]; G. P. Airey[2]; [1]British Energy, Barnett Way, Barnwood, Glouster GL4 7RS UK; [2]British Energy

Modeling of the Stress Corrosion Cracking Initiation on Alloy 600 in Primary Water: *Son Le Hong*[1]; Claude Amzallag[2]; Angel Gelpi[3]; [1]Electricité de France, R&D Div., Centre des Renardières, Moret Sur Loing 77818 France; [2]Electricité de France, Septen, 12-14 Avenue Dutrièvoz, Villeurbanne Cedex 69628 France; [3]Framatome, Cedex 16, Paris La Défense 92084 France

Unique Primary Side Initiated Degradation in the Vicinity of the Upper Roll Transition in Once Through Steam Generators from Oconee Unite 1: *J. P. Molkenthin*[1]; T. P. Magee[1]; J. F. Hall[1]; G. C. Fink[1]; Dewey Rochester[2]; Al McIlree[3]; [1]ABB Combustion Engineering Nuclear Operations, CEP 9459-1209, P.O. Box 500, 100 Prospect Hill Rd., Windsor, CT 06095 USA; [2]Duke Power Company, Charlotte, NC USA; [3]Electric Power Research Institute, Palo Alto, CA USA

Primary Side Cracking at Tube Support Locations in Alloy 600 Steam Generator Tubes: *J. F. Hall*[1]; T. P. Magee[1]; J. P. Molkenthin[1]; G. C. Fink[1]; P. J. Plante[2]; A. Matheaney[3]; [1]ABB Combustion Engineering Nuclear Operations, 1000 Prospect Hill Rd., Windsor, CT 06095 USA; [2]Maine Yankee Atomic Power Company, Wiscasett, MN USA; [3]Southern California Edison Company, San Clemente, CA USA

BWR: Session III - System Definition

Tuesday 8:00 AM - 12:00 PM
August 3, 1999

Session Chair: R. Pathania, EPRI, Palo Alto, CA USA

First Lower Plenum ECP Measurement in an Operating BWR: *S. Hettiarachchi*[1]; D. A. Hale[1]; R. Burrill[1]; S. Suzuki[2]; [1]General Electric Nuclear Energy, 6705 Vallecitos Rd., Surol, CA 94586 USA; [2]Tokyo Electric Power Company, Yokohama Japan

Corrosion Potential Monitoring in Swedish BWRs on Hydrogen Water Chemistry: *A. Molander*[1]; K. Pein[1]; A. L. Forsgren[1] G. Karlberg[2]; [1]Studsvik Material, AB, SE-611 82, Nykoping SE-611 82 Sweden; [2]Barseback Kraft AB, P.O. Box 524, Loddekopinge SE-246 25 Sweden

ECP Suppression Mechanism and ECP Simulation for a Small-Area Noble Metal Deposition under Hydrogen Water Chemistry Conditions: *Masanori Sakai*[1]; [1]Hitachi, Ltd., Hitachi Research Laboratory, 1-1, Oimka-cho 7 Chome, Hitachi-shi, Ibaraki-ken 319-12 Japan

The Role of H_2O_2 on ECP Under Different Flow Rate and Temperature: *M. Sambongi*[1]; S. Suzuki[1]; J. Takagi[2]; N. Ichikawa[2]; K. Akamine[3]; M. Sakai[3]; [1]Tokyo Electric Power Company, Mats. Eng. Lab.; [2]Toshiba; [3]Hitachi

PWR Primary: Session III - Hydrogen Effects & Microstructure

Tuesday 8:00 AM - 12:00 PM
August 3, 1999

Session Chairs: W. J. Mills, Bettis Atomic Power Laboratory, West Miffin, PA 15122-0079 USA; P. Doherty, Babcock & Wilcox, Canada

Environmental Cracking Behavior of Nickel-Based Alloys in Low Temperature H_2O: *W. J. Mills*[1]; C. M. Brown[1]; M. G. Burke[1]; [1]Bettis Atomic Power Laboratory, P.O. Box 79-ZAP 03N, West Miffin, PA 15122-0079 USA

An Experimental Study of the Hydrogen Embrittlement of Alloy 718 in PWR Primary Water: *O. Brucelle*[1]; J. G. Spilmont[1]; J. Cloue[1]; M. Foucault[1]; E. Andrieu[2]; [1]Framatome Fuel Division, Tour Fiat, 10, Rue, 1 Place de la Coupole, Paris - La Defense, Cedex 16 92084 France; [2]ENSC Toulouse, 118 Route de Narbonne, Toulouse, Cedex 04 31077 France

Hydrogen Assisted Failure of Alloys X-750 And 625 under SSRT Conditions: *Robert S. Daum*[1]; Arthur T. Motta[1]; Donald A. Koss[2]; Digby D. Macdonald[2]; [1]Penn State University, Dept. of Mech. and Nuclear Eng., 231 Sackett Bldg., University Park, PA 16802-1408 USA; [2]Penn State University, Dept. of Mats. Sci. and Eng., 202 Steidle Bldg., University Park, PA 16802-1408 USA

Hydrogen Embrittlement of Ph 13-08 Mo Stainless Steel in PWR Environment: Effects of Microstructure: *J. M. Cloue*[1]; M. Foucault[1]; E. Andrieu[2]; [1]Framatome Technical Center, Porte Magenta BP 181, I-20-DAW, Lyon Cedex 6 France; [2]ENSC Toulouse, 118 Route de Narbonne, Toulouse, Cedex 04 31077 France

Failure Investigation of Type 17-7 PH Leaf Spring Material: *H. Xu*[1]; J. Hyres[2]; S. Fyfitch[2]; P. F. Williams[2]; [1]University of Aero & Astronautics, Dept. of Mats. Sci., 37 Xueyuan Lu, Beijing 100083 China; [2]Framatome, Lynchburg

Stress Corrosion Crack Propagation Rate of Alloy 600 in Primary Water of PWR, Influence of a Cold Worked Layer: *O. Raquet*[1]*;* D. Feron[1], G. Santarini[1]; [1]CEA-CEREM

Combined Effect of Special Grain Boundaries and Grain Boundary Carbides on IGSCC of Ni-16Cr-9Fe-xC: *Brent M. Capell*[1]; Bogdan Alexandreanu[1]; Gary S. Was[1]; [1]University of Michigan, Dept. of Nuclear Eng. and Radiological Sci., 2940 Cooley Bldg., 2355 Bonisteel Blvd., Ann Arbor, MI 48109-2104 USA

On the Possible Existence of the Ordered Phase Ni_2Cr in Alloy 690: *J. O. Nilsson*[1]; T. Larsson[1]; J. Frodigh[2]; [1]Sandvik Steel, Research and Development Centre, Dept. of Phys. Metall., Sandviken, Sweden S-811 81; [2]Dept. of Tube Research

Regulation Aspects

Tuesday 6:00 PM - 10:00 PM
August 3, 1999

Session Chairs: F. P. Ford, GE CRD, USA; K. Gott, SKI, Sweden

EPRI R&D for Safe and Economic Long-term Nuclear Plant Operation: *R. Jones*[1]; J. Carey[1]; C. Wood[1]; [1]EPRI, Mats. and Corrosion, 3512 Hillview Ave., Palto Alto, CA 94303 USA

The History of Cracking the RCPB of Swedish BWR Plants: *Karen Gott*[1]; [1]Swedish Nuclear Power Inspectorate, S-106 58, Stockholm S-106 58 Sweden

Assessment of VVER Reactor Pressure Vessel Internals and Program of Lifetime Management: *Martin Ruscak*[1]; Miroslav Zamboch[1]; Oldrich Erben[2]; [1]Nuclear Research Institute Rez, Div. of Integrity and Mats., Vltavska 1, Rez 250 68 Czech Republic; [2]Nuclear Research Institute, Rez, Division of Nuclear Services, Vltavska 1, Rez 250 68 Czech Republic

Plant Life Management Programme Preparation for VVER-440/V-213c Units in Czech Republic: *Milan Brumovsky*[1]; Martin Ruscak[1]; Jiri Zdarek[1]; [1]Nuclear Research Institute, Rez, Div. of Integrity and Mats., Vltavska 1, Rez 250 68 Czech Republic

Regulatory Perspective of Industry's Response to GL 97-06, "Degradation of Steam Generator Internals": *Stephanie M. Coffin*[1]; [1]Nuclear Regulatory Commission, NRR/Div. of Eng., Mail Stop O-7-D4, Washington, DC 20555 USA

Status of Review of Issues and Applications for License Renewal by Materials Engineering Staff at the US Nuclear Regulatory Commission: *M. Banic*[1]; [1]US Nuclear Regulatory Commission, Mats. and Chem. Eng. Branch, O7D4, Washington, DC 20555 USA

Welding/Processing

Tuesday 6:00 PM - 10:00 PM
August 3, 1999

Session Chair: N. Iyer, Westinghouse, USA

Development of Compressive Residual Stresses in Underwater PTA Welds: *Z. Feng*[1]; E. Willis[2]; R. White[3]; H. D. Solomon[3]; [1]Edison Welding Institute, [2]GE Nuclear; [3]General Electric Corporate Research and Development Center

Development of Repair-Welding Technology for Irradiated Materials of LWR: *Kiyotomo Nakata*[1]; Hiroyuki Takeda[1]; Shigeki Kasahara[1]; Masayuki Oishi[1]; [1]Japan Power Engineering and Inspection Corporation, Tokyo Research & Development Center, Business Court Shin-urayasu Bldg., 9-2, Mihama 1-Chome, Urayasu, Chiba 279-0011 Japan

Use of Waterjet for Machining and Remediation of Nuclear Components: *J. B. Hall*[1]; K. B. Stuckey[1]; S. Fyfitch[1]; [1]Framatome, Lynchburg

Surface Modification for PWSCC Prevention of Alloy 600 by a Laser Cladding Technique: *Shigeki Kasahara*[1]; Masatoshi Sato[1]; Toshizo Ohya[2]; Masaya Kanikawa[3]; Hiroshi Kanasaki[1]; [1]Japan Power Engineering and Inspection Corporation, Tokyo R&D Center, Business Court Shin-urayasu 4F, 1-9-2 Mihama, Urayaasu, Chiba 279-0011 Japan; [2]Mitsubishi Heavy Industries, Ltd., KOBE Shipyard & Machinary Works, PlantService Engineering Sect., 1-1-1 Wadasaki, Hyogo-ku, Kobe, Hyogo 652-8585 Japan; [3]Mitsubishi Heavy Industries, Ltd., Takasago R & D Center, 2-1-1 Arai-cho, Takasago, Hyogo 676-8686 Japan

Welding as a Repair Option for BWR In-Vessel Components: *A. L. Lund*[1]; L. E. Willertz[2]; R. C. Thomas[3]; R. L. Dyle[4]; [1]U.S. Nuclear Regulatory Commission, 10E10 TWF, Washington, DC 20555 USA; [2]Pennsylvania Power and Light; [3]Electric Power Research Institute; [4]Inservice Engineering

BWR: Session IV - Mitigation/Life Extension

Wednesday 8:00 AM - 12:00 PM
August 4, 1999

Session Chairs: L. Nelson, EPRI, Palo Alto, CA USA; J. Hickling, CMC, Germany

Electrochemical Interactions of O2 and H2 on Noble Metal Doped 304 StSt in 288C Water: *Y. Kim*[1]; [1]General Electric Corporate Research and Development Center, One Research Circle, K1-3A37, Schenectady, NY 12301 USA

Full Cycle Performance of a Noblechem® Treated BWR: *S. Hettiarachchi*[1]; R. J. Law[1]; W. D. Miller[1]; T. P. Diaz[1]; R. L. Cowan[1]; [1]General Electric Nuclear Energy, 6705 Vallecitos Rd., Surol, CA 94586 USA

Effect of Corrosion Potential on the SCC Initiation Lifetime of Alloy 182 Weld Metal: *Norihisa Saito*[1]; Shigeaki Tanaka[2]; Hiroshi Sakamoto[2]; [1]Toshiba, Metal & Ceramics Tech. Gr., PIC, 8, Shinsugita-cho, Isogo-ku, Yokohama, Kanagawa 235-8523 Japan; [2]Toshiba, Applied Metall. & Chem. Dept., Nuclear Energy Div., 8, Shinsugita-cho, Isogo-ku, Yokohama, Kanagawa 235-8523 Japan

Effects of Mixed Metal Addition on Surface Film and Corrosion Prevention of Stainless Steel in BWR Water: *Takeshi Sakai*[1]; Yoshiyuki Saitoh[2]; Yuuji Midorikawa[2]; Teruchika Kikuchi[1]; [1]Nuclear Fuel Industries, Ltd., Eng. Svc. Dept., 950 Ohaza-Noda, Kumatori-Cho, Sennan-Gun, Osaka 590-0451 Japan; [2]Tohoku Electric Power Co., Inc., R&D Center, 2-17-Chome Nakayama, Aoba-Ku, Sendai, Miyagi 981-0952 Japan

The Predictive Effectiveness of NMCA at the Chinshan BWR: *Tsung-Kuang Yeh*[1]; Y. C. Lin[1]; C-H Tsai[1]; J. Chang[2]; F. Chu[2]; [1]National Tsing-Hua University; [2]Taipower

Corrosion Inhibition Using Aerobic Bacteria in Service Water Systems: *James C. Earthman*[1]; Khaled M. Ismail[1]; Peggy J. Arps[2]; Kirsten C. Trandem[1]; [1]University of California, Irvine, Chemical and Biochemical Eng. and Mats. Sci., 916 Engineering Tower, Irvine, CA 92697 USA; [2]University of Nevada-Reno, Dept. of Chem. and Metall. Eng., Reno, NV 89557-0136 USA

Low Alloy Steel: Session I - Embrittlement

Wednesday 8:00 AM - 12:00 PM
August 4, 1999

Session Chairs: G. Lucas, University of California, Santa Barbara, CA USA; E. Simonen, PNNL, USA

Observations on Sensitivity of RPV Integrity Probabilistic Fracture Mechanics Evaluations to Input Parameters: *Allen L. Hiser*[1]; Simon C. F. Sheng[1]; Shah N. Malik[2]; [1]U.S. Nuclear Regulatory Commission, Mats. and Chem. Eng. Branch, Mailstop O-7D4, Washington, DC 20555 USA; [2]Electrical, Materials and Mechanical Engineering Branch

Irradiation Behavior of Electricite De France PWR Vessel Steel: *C. Pichon*[1]; Y. Grandjean[2]; S. Saillet[2]; *G. Bezdikian*[2]; J. M. Frund[3]; [1]SEPTEN, Direction de I'Equipement, Electricite de France, 12-14 Avenue Dutrevoz, Villeurbanne Cedex 69628 France; [2]Electricite de France - Exploitation du Parc Nucleaire, Group des Laboratoires, Service d'Expertises, de Chinon, BP23, Avoine 37420 France; [3]Electricite de France - Direction des Etudes et Recherches, Departement EMA, Les Renardieres route de Sens, Ecuelles, Moret Sur Loing 77818 France

Effects of Copper, Phosphorus and Nickel on Radiation Damage in Astm A 533-b Type Steel: *Milan Brumovsky*[1]; [1]Nuclear Research Institute Rez, Div. of Integrity and Mats., Vltavska 1, Rez 250 68 Czech Republic

Understanding the Role of Defect Production in Radiation Embrittlement of Reactor Pressure Vessels: *Dale E. Alexander*[1]; P. R. Jemian[2]; L. E. Rehn[1]; B. J. Kestel[1]; G. R. Odette[3]; G. E. Lucas[3]; D. Klingensmith[3]; D. Gragg[3]; [1]Argonne National Laboratory, Mats. Sci. Div., Bldg. 212, Rm. E-206, 9700 South Cass Ave., Argonne, IL 60439 USA; [2]University of Illinois at Urbana-Champaign, Materials Research Laboratory, UNICAT, Argonne, IL 60439 USA; [3]University of California-Santa Barbara, Dept. of Mech. and Environ. Eng., Santa Barbara, CA 93106 USA

The Effect of Neutron Irradiation on Positron Lifetime and Micro-Vickers Hardness of Fe-Cu Model Alloys and Reactor Pressure Vessel Steel: Angela Hempel[1]; Masayuki Hasegawa[1]; *Gerhard Brauer*[2]; Masaaki Saneyasu[1]; Fernando Plazaola[3]; Sadae Yamaguchi[1]; [1]Tohoku University, Institute of Materials Research, Katahira 2-1-1, Sendai-chi, Aoba-Ku, Sendai 980-8577 Japan; [2]Research Center Rossendorf, Inc., Institute for Ion Beam Physics and Materials Research, P.O. Box 510119, Dresden 01314 Germany; [3]Elektrika & Elektronika Saila, UPV/EHU Zientzi Fakultatea, 644 P.K., Bilbo 48080 Spain

Effects of Radiation and Thermal Ageing on Reactor Pressure-vessel Steels Studied by Means of Internal Friction.: *Krist'l Van Ouytsel*[1]; Albert Fabry[1]; René De Batist[2]; Robert Schaller[3]; [1]Belgian Nuclear

Research Centre, Reactor Materials Research, Boeretang 200, Mol, Antwerp 2400 Belgium; [2]RUCA University of Antwerp, Groenenborgerlaan 171, Antwerp 2020 Belgium; [3]Ecole Polytechnique Fédérale de Lausanne, Institut de Génie Atomique, PHB-Ecublens, Lausanne CH-1015 Switzerland

An Evaluation of Temper Embrittlement in A508 Class 4 Steel: *D. B. Knorr*[1]; [1]Lockheed-Martin Corporation, P.O. Box 1072, Schenectady, NY 12301 USA

PWR Primary: Session IV - Crack Growth & Creep

Wednesday 8:00 AM - 12:00 PM
August 4, 1999

Session Chairs: R. Tapping, AECL, Canada; J. Hall, ABB Combustion

Stress Corrosion Crack Growth Rate Measurements on Ni Alloys in Primary and Caustic Environments: *Thierry Cassagne*[1]; D. Caron[1]; J. Daret[1]; A. Proust[2]; G. Turluer[3]; D. Boulanger[3]; [1]CEA/CEREM/LETC, Etablissement de La Hague, 50444 Beaumont, Hague, Cedex France; [2]EPA [3]IPSN-DES

Stress Corrosion Life Assessment of Alloy 600 PWR Components: *C. Amzallag*[1]; S. Le Hong[1]; F. Vaillant[1]; C. Pages[1]; [1]Electricite de France, Exploitatin du Parc Nucleaire, Dept. Maintenance, 1 Placy Pleyel, Saint-Denis, Cedex 93207 France; [1]Electricite de France - Direction de I'Equipement, SEPTEN-Division Reaceur, 12-14, Avenue Dutrievoz, Villeurbanne, Cedex 69628 France

Static Load Crack Growth of Alloy 182 in Simulated PWR Environment: *W. Bamford*[1]; J. Foster[1]; R. Pathania[2]; [1]Westinghouse; [2]EPRI, Palo Alto, CA USA

Accelerated SCC Cracks Initiation Susceptibility Testing of Alloy 600 Reactor Vessel Head Penetration Materials: *G. V. Rao*[1]; R. J. Jacko[1]; R. Pathania[2]; [1]Westinghouse Electric Company, Pittsburgh, PA 15230 USA; [2]EPRI, Palo Alto, CA USA

A Simplified Correlation for SCC Susceptibility and An Evaluation Method for Effects of Cold Work Layer and Strength Characteristics on the Susceptibility: *Y. S. Garud*[1]; R. S. Pathania[2]; [1]APTECH Engineering Services, Inc., Sunnyvale, CA USA; [2]EPRI, Palo Alto, CA USA

Creep of Nickel-Base Alloys in High Temperature Water: *Gary S. Was*[1]; John Cookson[1]; Yongsun Yi[1]; John S. Fish[2]; S. A. Attanasio[2]; H. T. Krasodomski[2]; W. W. Wilkening[2]; [1]University of Michigan, Nuclear Eng. and Radiological Sci., 1911 Cooley Bldg., 2355 Bonisteel Blvd., Ann Arbor, MI 48109-2104 USA; [2]Lockheed Martin Corporation, Schenectady, NY 12301 USA

Influence of Chromium Content and Microstructure on Creep and PWSCC Resistance of Nickel Base Alloys: *F. Vaillant*[1]; J. D. Mithieux[1]; O. De Bouvier[1]; D. Vancon[1]; Y. Brechet[2]; F. Louchet[2]; [1]EDF, R&D Div., Mats. Dept., Les Renardieres, Moret Sur Loing 77818 France; [2]ENSEEG, Institut National Polytechnique de Grenoble France

Low Alloy Steel: Session II - EAC & Deformation

Wednesday 1:30 PM - 5:30 PM
August 4, 1999

Session Chairs: H. Hanninen, U Helsinki, Finland; H. P. Seifert, PSI, Switzerland

Stress Corrosion Cracking of Low Alloy Steels under BWR Conditions: Assessment of Possible Crack Growth Rates and Prediction of Component Behavior: *F. P. Ford*[1]; R. M. Horn[2]; J. Hickling[3]; G. Brummer[4]; R. Pathania[5]; [1]General Electric Corporate Research and Development Center, P.O. Box 8, Schenectady, NY 12301 USA; [2]General Electric Nuclear Energy; [3]Corrosion and Materials Consultancy; [4]Hamburgische Electricitaetswerke; [5]EPRI, Palo Alto, CA USA

Low Cycle Fatigue Crack Initiation in WB36 in High Temperature Water: *H. D. Solomon*[1]; R. E. Delair[1]; [1]General Electric Corporate Research and Development Center, P.O. Box 8, Room K1-3A51, Schenectady, NY 12301 USA

Program of Stress Corrosion Cracking Sensitivity of Irradiated Ferritic Steel: *Martin Ruscak*[1]; Gunter Brummer[2]; [1]Nuclear Research Institute Rez Plc., Div. of Integrity and Mats., Vltavska 1, Rez 250 68 Czech Republic; [2]HEW AG, Uberseering 12, Hamburg 22286 Germany

Determination of SCC Threshold in Ferritic RPV Steel by Constant Load and Constant Strain Rate Methods: *Anna Brozova*[1]; Martin Ruscak[1]; Wolfgang Dietzel[2]; [1]Nuclear Research Institute Rez Plc., Div. of Integrity/Corrosion and Microstucture D, Rez, Czech Republic 250 68; [2]GKSS-Forschungszentrum Geesthacht GmbH, Max-Planck Strasse, Geesthacht, Schleswig-Holstein D-21502 Germany

Evaluation of Crack Tip Solution Chemistry of Low Alloy Steels in Oxygenated High Temperature Water: *Yunju Lee*[1]; Tetsuo Shoji[1]; Raja Krishnan Selva[1]; [1]Tohoku University, Research Institute of Fracture Technology, Aobayama 01, Aobaku, Sendai 980-28579 Japan

Electrochemical Potential, ECP, Trends in Deaerator Feedwater Storage Vessel Welds: *J. H. Bulloch*[1]; E. Rochford[2]; [1]Power Generation ESB, Head Office, Dublin 2 Ireland; [2]Bellacorick P.S., Ballina Ireland

The Stress Corrosion Cracking of Reactor Pressure Vessel Steel under Boiling Water Reactor Conditions: *J. Heldt*[1]; H. P. Seifert[1]; [1]Paul Scherrer Institute, Laboratory for Safety and Accident Research, OVGA/120, Villigen, Kanton Aargau CH-5232 Switzerland

European Round Robin Test on Environmentally Assisted Cracking of Low Alloy Ferritic Steel under BWR Conditions: *K. Kuster*[1]; P. Karjalainen-Roikonen[2]; U. Ehrnsten[2]; A. Roth[3]; H. P. Seifert[4]; J. Heldt[4]; D. Blind[5]; F. Huttner[5]; A. Wunsche[5]; [1]HEW Hamburgische Electricicitats, Werke AG, Uberserring 12, Hamburg 22286 Germany; [2]VTT Finland; [3]Siemens KWU Germany; [4]PSI Switzerland; [5]MPA Stuttgart Germany

Aging Embrittlement of CF-8 Stainless Steel - A Non-Destructive Evaluation: *L. M. Lietzan*[1]; M. D. Mathew[1]; K. L. Murty[1]; V. N. Shah[2] [1]North Carolina State University, Raleigh, NC 27695-7909 USA; [2]INEL

PWR Secondary: Session I - System Definition

Wednesday 1:30 PM - 5:30 PM
August 4, 1999

Session Chairs: A. McIlree, EPRI, Palo Alto, CA USA; R. Staehle, University of Minnesota, USA

Experimental Simulation of Boiling Crevice Chemistry: *Chi Bum Bahn*[1]; Il Soon Hwang[1]; In Hyoung Rhee[2]; Uh Chul Kim[3]; Jung Won Na[3]; [1]Seoul National University, Dept. of Nuclear Eng., 56-1, Shinlim-dong, Gwanak-gu, Seoul 151-742 Korea; [2]Sun Chun Hyang University, Dept. of Chem. Eng., 53-1, Umnae-ri, Sinchang-myun, Asan, Chungnam Korea; [3]Korea Atomic Energy Research Institute, 150, Dukjin-dong, Yusong-gu, Taejon 305-353 Korea

Secondary Side Corrosion of French PWR Steam Generator Tubing: Contribution of Surface Analyses to the Understanding of the Degradation Process: *J. M. Boursier*[1]; M. Dupin[2]; P. Gosset[1]; Y. Rouillon[1]; [1]Electricite de France, Generating and Transmission Div., Chinon Hot Laboratory, Avoine, BP 23 37420 France

Evidence for the Reduction of Sulfates under Representative SG Secondary Side Conditions, and for the Role of Reduced Sulfates on Alloy 600 Tubing Degradation: *Jacques Daret*[1]; Th. Cassagne[1]; Y. Lefevre[1]; T. Tran[1]; R. Benoit[2]; R. Erre[2]; [1]CEA CEREM/LETC, Etablissement de La Hague, 50444 Beaumont Hague, Cedex France; [2]CNRS Orleans

Electrochemical Study of the Corrosion Process of the Secondary Side of the Steam Generators: *B. Sala*[1]; S. Chevalier[1]; A. Gelpi[1]; H. Takenouti[2]; M. Keddam[2]; [1]Technical Center of Framatome Porge Magenta, BP 181- 71205 Le Creusot, Cedex France; [2]LP15 du CNRS, Physique des Liquides et Electrochimie, Tour 22, 4 Place Jussieu 75252, Paris, Cedex 02 France

High Temperature Flow Assisted Corrosion of Carbon and Low Alloy Steels: *M. J. Psaila-Dombrowski*[1]; F. H. Hua[1]; P. E. Doherty[2]; [1]Babcock & Wilcox, Research & Development Division, 531, Coronation Blvd., Cambridge, Ontario N1R 5V3 Canada; [2]Babcock & Wilcox International, 531, Coronation Blvd., Cambridge, Ontario N1R 5V3 Canada

Radiation Effects: Session I - Radiation Effects on Stress Corrosion Cracking

Wednesday 1:30 PM - 5:30 PM
August 4, 1999

Session Chairs: S. Bruemmer, PNNL, USA; T. Shoji, Tohoku University, Japan

Effect of Pre-irradiation Grain Boundary Chemistry on IASCC: *Mitsuhiro Kodama*[1]; Yoshihide Ishiyama[1]; Shunichi Suzuki[2]; Satoshi Namatame[2]; Koji Fukuya[3]; Hiroshi Sakamoto[3]; Kiyotomo Nakata[4]; Takahiko Kato[4]; [1]Nippon Nuclear Fuel Development Co., Ltd., Research, 2163, Narita-cho, Oarai-machi, Higashi-Ibaraki-gun, Ibaraki-ken 311-1313 Japan; [2]The Tokyo Electric Power Co., Ltd., Egasaki-cho, Tsurumi-ku, Yokohama, Kanagawa-ken 230-8510 Japan; [3]Toshiba Corporation, Shinsugita, Isogo-ku, Yokohama, Kanagawa-ken 235-8523 Japan; [4]Hitachi, Ltd., Saiwai-cho, Hitachi-shi, Ibaraki-ken 317-8511 Japan

Irradiation-Assisted Stress Corrosion Cracking of Model Austenitic Stainless Steels: *H. M. Chung*[1]; W. E. Ruther[1]; R. V. Strain[1]; W. J. Shack[1]; T. M. Karlsen[2]; [1]Argonne National Laboratory, 9700 S Cass Ave., Argonne, IL 60439 USA; [2]OECD Halden Reactor Project, Halden Norway

Intergranular Cracking of an Irradiated Ti-Stabilized Stainless Steel Spacer Grid Sleeve from a VVER-440 Reactor: *Ulla M. Ehrnstén*[1]; Pertti Aaltonen[1]; Pertti Nenonen[1]; Risto Teräsvirta[2]; Ossi Hietanen[2]; [1]VTT Manufacturing Technology, P.O. Box 1704, Espoo, VTT 02044 Finland; [2]IVO, Power Engineering Ltd, Vantaa, IVO 01019 Finland

Water Chemistry and Stress Intensity Effects on the Cracking Behaviour of Irradiated Austenitic Stainless Steels: *Elisabeth Hauso*[1]; Torrill Karlsen[1]; [1]OECD Halden Reactor Project, P.O. Box 173, N-1751, Halden Norway

Neutron Irradiation-Induced Changes in Percent IGSCC of Thermally-Sensitized Type 304 Stainless Steels: *Takeo Onchi*[1]; Koichiro Hide[1]; Masami Mayuzumi[1]; Taiji Hoshiya[2]; [1]CRIEPI, Komae Research Laboratory, 2-11-1, Iwado Kita, Komae-shi, Tokyo 201-8511 Japan; [2]JAERI, Narita-cho, Oarai-Machi, Ibaraki-ken 311-13 Japan

Stress Corrosion Cracking of Type 304L Stainless Steel Core Shroud Welds: *H. M. Chung*[1]; J. H. Park[1]; J. E. Sanecki[1]; N. J. Zaluzec[1]; T. T. Yang[2]; M. S. Yu[2]; [1]Argonne National Laboratory, Argonne, IL 60439 USA; [2]Institute for Nuclear Energy Research, Lungtan, Tiawan ROC

Development of Comprehensive Material Performance Database (JMPD) and Analyses of Irradiation Assisted Stress Corrosion Cracking Data: *Yoshiyuki Kaji*[1]; Takashi Tsukada[1]; Hirokazu Tsuji[1]; Hajime Nakajima[1]; [1]Japan Atomic Energy Research Institute, Dept. of Nuclear Energy Sys., Shirakata-Shirane 2-4, Tokai-mura, Naka-gun, Ibaraki 319-1195 Japan

PWR Secondary: Session II - Cracking Response

Thursday 8:00 AM - 12:00 PM
August 5, 1999

Session Chairs: P. Millet, EPRI, Palo Alto, CA USA; F. DeKeroulas, EDF, France

Roll of Grain Boundary Characteristics in Caustic IGA/SCC Resistance of Thermally Treated Alloy 690 and Shot Peened Alloy 800: *H. Kawamura*[1]; H. Hirano[1]; S. Shirai[2]; H. Takamatsu[3]; M. Matsunaga[3]; K. Yamaoka[4]; K. Oshinden[5]; H. Takiguchi[6]; [1]Komae Research Laboratory, Central Research Institute of Electric Power Industry, Iwatokita, Komae-shi, Tokyo 201 Japan; [2]The Hokkaido Electric Power, Co., Inc., Facilities Management Sec., Nuclear Power Dept., Higashi 1-2, Ohdori, Chuo-ku, Sapporo 060-91 Japan; [3]The Kansai Electric Power Co., Inc., General Office of Nuclear and Fossil Poer Production, 3-3-22, Nakanoshima, Kita-ku, Osaka 530-70 Japan; [4]The Shikoku Electric Power Co., Inc., Nuclear Power Operating Management Sec., Nuclear Power Dept., 2-5, Marunouchi, Takamatsu, Kagawa 760-91 Japan; [5]The Kyushu Electric Power Co., Inc., Nuclear Operation Dept., 2-1-82, Watanabe-Dori, Chuo-ku, Fukuoka 810-91 Japan; [6]The Japan Atomic Power Co., Inc., Plant Management Headquarters, Plant Eng. Dept., 1-6-1, Otemachi, Chiyoda-ku, Tokyo 100 Japan

Causes and Mitigation of OD Stress Corrosion Cracking: *Allen Baum*[1]; P. J. Prabhu[2]; Peter Kuchirka[2]; [1]Westinghouse Electric Corporation, 1006 Macon Ave., Pittsburgh, PA 15218 USA; [2]Westinghouse Electric Corporation, P.O. Box 158, Madison, PA 15168 USA

Top of Tubesheet Cracking Bruce-A NGS Steam Generator Tubing: An Assessment of Bruce A Versus Bruce B Tubing Material: *M. Mirzai*[1]; M. Clark[2]; O. Lepik[2]; I. Thompson[2]; [1]Ontario Hydro Nuclear, 700 University Ave., Toronto, Ontario M5G 1X6 Canada; [2]Ontario Hydro Technologies, 800 Kipling Ave., Toronto Canada

ATEM and SIMS Examinations of Oconee Nuclear Station Steam Generator Pulled Tubes: *D. P. Rochester*[1]; [1]Duke Power Company, Nuclear Chemistry, 526 S. Church St., EC07D, Charlotte, NC 28202 USA

Corrosion Control and Lay-up of the Crystal River-3 Steam Generators and Secondary Plant during an Extended Outage: *Rocky H. Thompson*[1]; Bill Kassen[2]; [1]Florida Power Corporation, 15760 W. Power Line St., NR-1A, Crystal River, FL 34428 USA; [2]NWT Corporation, 7015 Real Dr., San Jose, CA 95119 USA

Lead Induced SCC Propagation Rates in Alloy 600: *Michael D. Wright*[1]; [1]AECL, Chalk River Laboratories, Chalk River, Ontario KOJ 1JO Canada

Radiation Effects: Session II - Radiation Effects on Deformation and Swelling

Thursday 8:00 AM - 12:00 PM
August 5, 1999

Session Chairs: G. Was, University of Michigan, USA; K. Pettersson, Royal Institute, Stockholm Sweden

Irradiation Creep Behavior of High-Purity Stainless Steels and Ni Base-Alloys: *F. Garzarolli*[1]; P. Dewes[1]; S. Trapp Pritsching[1]; J. L. Nelson[2]; [1]Siemens AG. KWU. NBTW, Kembrennstoff-Kreislauf, Hammerbacherstr 12&14, Postfach 3220, Elangen, FRG D-91050 Germany; [2]EPRI, P.O. Box 10412, Palo Alto, CA 94303 USA

Effects of Neutron Irradiation on Mechanical Behavior of Nickel-Based Fastener Alloys: *R. Bajaj*[1]; W. J. Mills[1]; B. F. Kammenzind[1]; M. G. Burke[1]; [1]Bettis Atomic Power Laboratory, P.O. Box 79-ZAP 03N, West Mifflin, PA 15122-0079 USA

Radiation-Induced Microstructure Effects on the Hardening and Deformation Behaviour of Austenitic Stainless Steel: *D. J. Edwards*[1]; E. P. Simonen[1]; S. M. Bruemmer[1]; [1]Pacific Northwest National Laboratory, P.O. Box 999, MSC P8-15, Richland, WA 99352 USA

Optimized Chemical Composition and Heat Treatment Conditions of 316CW and High Chromium Austenitic Stainless Steels for PWR Baffle Former Bolts: *T. Yonezawa*[1]; [1]Mitsubishi Heavy Industries, Ltd., Ftakasago R&D Center

Recent Data on Void Formation in US & Russian Stainless Steels at PWR-Relevant Conditions: *F. A. Garner*[1]; G. L. Bond[2]; B. A. Gurovich[3]; S. I. Porollo[4]; [1]Pacific Northwest National Laboratory; [2]New Mexico Institute; [3]Kurchatov Institute of Atomic Energy; [4]Institute Physics & Power Engineering

The Effect of Low Dose Rate Irradiation on the Swelling of 12% ColdWorked 316 SS: *T. R. Allen*[1]; J. Cole[1]; H. Tsai[1]; S. Ukai[2]; S. Mizuta[2]; T. Yoshitake[2]; [1]Argonne National Laboratory-West, Eng. Div., P.O. Box 2528, Idaho Falls, ID 83403-2528 USA; [2]Argonne National Laboratory, Energy Technology, 9700 South Cass Ave., Argonne, IL 60439-4832 USA; [3]Power Reactor & Nuclear Fuel Development Corporation, Fuel and Material Div., 4002 Narita, Ibaraki-ken, Oarai-machi 311-13 Japan

Measurement of Hydrogen Generation, Accumulation & Release in Irradiated Fe and Ni Alloys during Irradiation: *F. A. Garner*[1]; B. M. Oliver[1]; B. A. Gurovich[2]; [1]Pacific Northwest National Laboratory; [2]Kurchatov Institute of Atomic Energy

PWR Secondary: Session III - Mechanisms

Thursday 1:30 PM - 5:30 PM
August 5, 1999

Session Chair: P. Lichtenberger, Ontario Hydro, Canada

Modelling the Secondary Side Corrosion of Tubings: A Help to the Maintenance Policy of PWRs Steam Generators: *F. Vaillant*[1]; E. M. Pavageau[1]; M. Bouchacourt[2]; J. M. Boursier[3]; P. Lemaire[3]; [1]EDF, R&D Division; [2]Engineering and Construction Division

Interfacial Materials for Optimizing Nuclear Steam Generator Reliability: *G. Palumbo*[1]; *F. Gonzalez*[2]; P. E. Doherty[3]; M. Psaila-Dombrowski[4]; [1]Ontario Hydro Technologies, Microengineered Mats. Dept., 700 University Ave., Toronto, Ontario M8Z 5S4 Canada; [2]Ontario Hydro Technologies, Mats. Tech. Dept., Toronto, Ontario M8Z 5S4 Canada; [3]Babcock & Wilcox Industries, Ltd., 531, Coronation Blvd., Cambridge, Ontario N1R 5V3 Canada; [4]McDermott Technologies, Inc., Alliance, OH USA

Pb SCC of Alloy 690: *M. J. Psaila-Dombrowski*[1]; F. H. Hua[1]; P. E. Doherty[2]; [1]Babcock & Wilcox, Research & Development Div., 531, Coronation Blvd., Cambridge, Ontario N!R 5V3 Canada; [2]Babcock & Wilcox International

Development & Application of the SCC Parameter for Predicting SCC with Application to Secondary Side Applications: *R. W. Staehle*[1]; Z. Fang[1]; [1]University of Minnesota, Dept. of Chem. Eng. and Mats. Sci., Corrosion Center

Nickel Alloy Stress Corrosion Cracking in Neutral and Lightly Alkaline Sulfate Environments: *O. DeBouvier*[1]; [1]EDF, R&D Division, Mats. Studies Dept., Les Renardleras, Moret sur Loing Cedex 77818 France

Radiation Effects: Session III - Radiation Effects on Microstructure and Microchemistry

Thursday 1:30 PM - 5:30 PM
August 5, 1999

Session Chairs: S. Suzuki, TEPCO R&D, Japan; P. Spellward, Magnox Electric, UK

Microstructural, Microchemical and Hardening Evolution in LWR-Irradiated Austenitic Stainless Steel: *S. M. Bruemmer*[1]; B. W. Arey[1]; L. A. Charlot[1]; D. J. Edwards[1]; [1]Battelle Pacific Northwest National Laboratory, P.O. Box 999, Mail Bin 16, Richland, WA 99352 USA

Microchemistry and Microstructure Evolution in Proton-Irradiated Austenitic Stainless Steels: *Jeremy T. Busby*[1]; Jian Gan[1]; Matthew Daniels[2]; Steve Bruemmer[3]; E. A. Kenik[4]; G. S. Was[1]; [1]University of Michigan, Dept. of Nuclear Eng. and Radiological Sci., 2940 Cooley Bldg., 2355 Bonisteel Blvd., Ann Arbor, MI 48109-2104 USA; [2]University of Michigan, Dept. of Mats. Sci. and Eng., 2940 Cooley Bldg., 2355 Bonisteel

Blvd., Ann Arbor, MI 48109-2104 USA; [3]Battelle Pacific Northwest National Laboratory, P.O. Box 999, Mail Bin 16, Richland, WA 99352 USA; [4]Oak Ridge National Laboratory, Metals and Ceramics Div., Bldg. 5500 MS 6376, P.O. Box 2008, Oak Ridge, TN 37831 USA

Comparison of Radiation Induced Degradation in Several Austenitic Stainless Steels Used for Core Internals in LWR: *T. Aoki*[1]; T. Fukuda[2]; M. Sagisaka[1]; Y. Isobe[3]; K. Abe[2]; A. Hasegawa[2]; M. Satou[2]; K. Matsueda[3]; Y. Nishida[3]; Y. Kaneshima[3]; [1]Toshiba Heavy Apparatus Engineering Laboratory, 2-4 Suehire-cho, Tsurumi-ky, Yokohama 230 Japan; [2]Tohoku University; [3]The Kansai Electric Power, Co., Inc.

Local Evolution of Microstructure and Microchemistry Near Irradiated Grain Boundaries in Austenitic Stainless Steels: *E. P. Simonen*[1]; D. J. Edwards[1]; S. M. Bruemmer[1]; [1]Battelle Pacific Northwest National Laboratory, P.O. Box 999, MSIN P8-15, Richland, WA 99352 USA

Effect of Minor Elements on EAC of Austenitic Simulated Steels in PWR Primary Water and Implication to IASCC: *Guangfu Li*[1]; *Yoshiari Kaneshima*[2]; Testsuo Shoji[1]; [1]Tohoku University, Research Institute for Fracture Technology, Graduate School of Engineering, 01 Aza-Aoba, Aramaki, Aoba-ku, Sendai 980-8579 Japan; [2]The Kansai Electric Power Co., Inc., Office of Nuclear and Fossil Power Production, 3-3-22, Nakanoshima, Kita-Ku, Osaka 530-8270 Japan

Studies on Surface Oxide Films of Stainless Steels Having Simulated Post-irradiated Grain Boundary Chemistries: *K. S. Raja*[1]; T. Shoji[1]; [1]Tohoku University, Research Institute of Fracture Technology, Aobayama 01, Aobaku, Sendai 980-28579 Japan

Zircaloy

Thursday 1:30 PM - 5:30 PM
August 5, 1999

Session Chairs: R. Adamson, GE Nuclear, USA; F. Garzarolli, Seimens, Germany

The Use of Impedance Spectroscopy to Follow Oxidation of Zirconium Alloy in Situ at High Temperature: *B. Albinet*[1]; B. Sala[1]; A. Frichet[2]; [1]Framatome, Tour Fiat, 1 Place de la Coupole, Paris, -LaDefense, Cedex 16 92084 France; [2]Framatome - Lyon

Amorphization of Laves-Phase Precipitates in Zircaloy-4 by Neutron Irradiation: *Dale F. Taylor*[1]; H. Richard Peters[1]; Walter J. S. Yang[1]; [1]Lockheed Martin Corporation, MS-089, P.O. Box 1072, Bldg. C-1, Rm 126, Schenectady, NY 12301-0172 USA

Transitions in Creep of Zircaloy-4 Tubing under Biaxial Loading: *M. D. Mathew*[1]; Y. Wang[1]; K. L. Murty[1]; [1]North Carolina State University, Raleigh, NC 27695-7909 USA

NobleChem Fuel Surveillance Program: *Daniel Reese Lutz*[1]; Ronald B. Adamson[1]; Robert L. Cowan[2]; Harry A. Levin[2]; [1]General Electric Nuclear Energy, Mats. Tech., 6705 Vallecitos Rd., M/C V03, Sunol, CA 94586 USA; [2]General Electric Nuclear Energy, 175 Curtner Ave., M/C 783, San Jose, CA 95125 USA

Characteristics of Axial Splits in Failed BWR Fuel Rods: *Gunnar Lysell*[1]; V. Grigoriev[1]; K. Pettersson[1]; [1]Royal Institute, Stockholm; [1]Studvik Nuclear AB, Nykoping SE-611 82 Sweden

AC Impedance Characteristics of Oxide Films on Zircaloy-4: *Jeong Youn Lim*[1]; Il Soon Hwang[1]; [1]Seoul National University, Dept. of Nuclear Eng., 56-1, Shinlim-dong, Gwanak-gu, Seoul 151-742 Korea

The Fracture of Zircaloy-2 Plate and Cladding in High Pressure Hydrogen Gas: *G. Rowe*[1]; S. T. Mahmood[2]; S. B. Wisner[2]; R. B. Adamson[2]; [1]General Electric CRD, P.O. Box 8, Schenectady, NY 12301 USA; [2]GE Nuclear

On the Mechanism of Axial Splits in Failed BWR Fuel Rods: *K. Edsinger*[1]; S. Vaidyanthan[1]; R. B. Adamson[1]; [1]General Electric Nuclear Energy, Vallecitos Nuclear Center

Studies on Delayed Hydride Cracking of Zircaloy Cladding: *Kjell R. Pettersson*[1]; Pål Efsing[2]; Kwadwo Kese[1]; [1]KTH (Royal Institute of Technology), Dept. of Mats. Sci. and Eng., Mech. Metall., Stockholm SE-100 44 Sweden; [2]Barsebäck Kraft AB, P.O. Box 524, Löddeköpinge SE-246 25 Sweden

ADVANCE REGISTRATION FORM

NINTH INTERNATIONAL CONFERENCE ON ENVIRONMENTAL DEGRADATION OF MATERIALS IN NUCLEAR POWER SYSTEMS-WATER REACTORS

August 1-5, 1999 ■ Newport Beach Marriott Hotel & Tennis Club

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PAYMENT MUST ACCOMPANY FORM ■ FORMS RECEIVED AFTER THIS DATE WILL BE PROCESSED AT THE ON-SITE FEE

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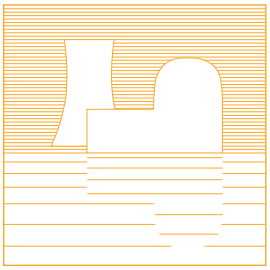

NINTH INTERNATIONAL CONFERENCE ON ENVIRONMENTAL DEGRADATION OF MATERIALS IN NUCLEAR POWER SYSTEMS-WATER REACTORS
August 1-5, 1999 ■ Newport Beach Marriott Hotel & Tennis Club

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All reservations must be received by: **MONDAY, JULY 12, 1999**

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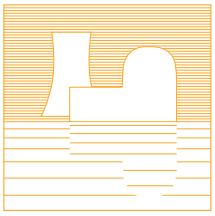

NINTH INTERNATIONAL CONFERENCE ON ENVIRONMENTAL DEGRADATION OF MATERIALS IN NUCLEAR POWER SYSTEMS-WATER REACTORS
August 1-5, 1999 ■ Newport Beach Marriott Hotel & Tennis Club

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