

16th International Conference on Environmental Degradation of Materials in Nuclear Power Systems-Water Reactors 2013

Asheville, North Carolina, USA
11-15 August 2013

Volume 1 of 3

ISBN: 978-1-5108-1923-8

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2013) by NACE International
All rights reserved.

Printed by Curran Associates, Inc. (2016)

For permission requests, please contact NACE International
at the address below.

NACE International
15835 Park Ten Place
Houston, TX, USA 77084
USA

Phone: (281) 228-6200
Fax: (281) 228-6300

firstservice@nace.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

ALLOY 690 AND WELDS #1

MODELLING GRAIN BOUNDARY CHROMIUM CONCENTRATION IN RELATION TO GRAIN BOUNDARY CARBIDE COVERAGE IN ALLOY 690.....	1
<i>Y. Yin, R. Faulkner, R. Higginson</i>	
THE KINETICS OF LONG RANGE ORDERING IN NI-CR AND NI-CR-FE ALLOYS	13
<i>G. Young, J. Tucker, D. Eno</i>	

ALLOY 690 AND WELDS #2

EFFECT OF DEFORMATION TEMPERATURE, ORIENTATION AND CARBIDES ON SCC OF ALLOY 690.....	35
<i>P. Andresen, M. Morra, K. Ahluwalia</i>	
ACCELERATED STRESS CORROSION CRACK INITIATION OF ALLOY 690 AND ALLOY 600 IN HIGH TEMPERATURE HYDROGENATED WATER.....	57
<i>T. Moss, G. Was</i>	
THE EFFECTS OF METALLURGICAL FACTORS ON PWSCC CRACK GROWTH RATE IN SIMULATED PWR PRIMARY WATER FOR TT ALLOY 690	69
<i>T. Yonezawa</i>	
PWSCC SUSCEPTIBILITY OF ALLOY 690, 52 AND 152 AND ASSESSMENT OF PWR PRIMARY SYSTEM COMPONENTS	82
<i>T. Maeguchi, Y. Nagoshi, S. Hirano</i>	
MICROSTRUCTURAL EFFECTS ON STRESS CORROSION CRACK GROWTH IN COLD-WORKED ALLOY 690 TUBING AND PLATE MATERIALS	96
<i>S. Bruemmer, M. Olszta, N. Overman, M. Toloczko</i>	
PRIMARY WATER STRESS CORROSION CRACK GROWTH IN COLD WORKED ALLOY 690 PLATE.....	110
<i>D. Paraventi, W. Moshier</i>	
PWSCC OF COLD-WORKED ALLOY 690 CRDM AND WELD METALS ALLOY 52 AND 152	128
<i>F. Perosanz, M. Garcia, J. Lapena, G. Diego, D. Gomez-Briceno</i>	

ALLOY 690 AND WELDS #3

SCC OF ALLOY 152/52/52I WELD METALS IN PWR PRIMARY WATER.....	147
<i>P. Andresen, M. Morra, K. Ahluwalia</i>	
LOW TEMPERATURE CRACK PROPAGATION (LTCP) SUSCEPTIBILITY OF NICKEL-BASED WELD METALS ALLOY 182, 152 AND 52 IN PWR PRIMARY WATER	169
<i>M. Ahonen, U. Ehrnsten, T. Saukkonen, O. Todoshchenko, H. Hanninen</i>	
ALLOY 690 & WELD METAL REFERENCE SCC GROWTH RATE FOR ASME SECTION XI	189
<i>W. Bamford, G. Deboo</i>	
STRESS CORROSION CRACKING BEHAVIOR OF EN52/EN52I IN DEAERATED WATER	200
<i>D. Morton, E. West, J. Mullen, R. Etien</i>	
OBSERVATIONS AND IMPLICATIONS OF INTERGRANULAR STRESS CORROSION CRACK GROWTH OF ALLOY 152 WELD METALS IN SIMULATED PWR PRIMARY WATER.....	214
<i>M. Toloczko, M. Olszta, N. Overman, S. Bruemmer</i>	
STRESS CORROSION CRACK GROWTH RESPONSE FOR ALLOY 152/52 DISSIMILAR METAL WELDS IN PWR PRIMARY WATER.....	238
<i>M. Toloczko, M. Olszta, N. Overman, S. Bruemmer</i>	

BWR SCC AND WATERH CHEMISTRY #1

THE EFFECT OF TEMPERATURE ON THE CRACK GROWTH RATE OF SENSITIZED STEEL IN BWR NORMAL WATER CHEMISTRY WITH SULFATE	263
<i>J. Stjarnsater, A. Jenssen, B. Bengtsson, B. Forssgren, M. Cocco</i>	

THE EFFECT OF DEFORMATION TEMPERATURE ON THE SUSCEPTIBILITY TO IGSCC OF TYPE 316 L STAINLESS STEEL IN BWR NWC	278
<i>J. Stjarnsater, P. Ekstrom, B. Bengtsson, B. Forssgren, M. Cocco</i>	
SCC PERFORMANCE OF ALTERNATIVE BWR STRUCTURAL MATERIALS WITH VARYING CHROMIUM CONCENTRATIONS.....	290
<i>E. Dolley, P. Andresen, M. Morra, X. Lou, R. Rebak</i>	
IMPROVEMENT OF CORROSION RESISTANCE IN AUSTENITIC STAINLESS STEEL BY GRAIN BOUNDARY CHARACTER DISTRIBUTION CONTROL	310
<i>J. Kaneda, Y. Wang, S. Kasahara, N. Shigenaka</i>	
METALLURGICAL STUDY ON IGSCC ON THE PLANE PERPENDICULAR TO THE PRE-FATIGUE CRACK PLANE OF DCB AND CT SPECIMENS IN HIGH TEMPERTURE WATER	329
<i>S. Yaguchi, T. Yonezawa</i>	

BWR SCC AND WATER CHEMISTRY #2

SCC OF ALLOY 825, HIGH CR ALLOY 800 AND OTHER INTERESTING ALLOYS.....	341
<i>P. Andresen</i>	
EFFECT OF PLASTIC STRAIN ON SCC SUSCEPTIBILITY FOR NICKEL BASE ALLOYS IN SIMULATED BWR ENVIRONMENT.	373
<i>Y. Sakakibara, G. Nakayama, T. Hirano</i>	
THE EVALUATION OF FRACTURE TOUGHNESS AND RAPID DRACATURE IN A BWR ENVIRONMENT BY COLLAPSE LOAD	391
<i>Y. Itabashi, M. Takanashi, T. Hirano</i>	
UNDERSTANDING RAPID FRACTURE PHENOMENON IN HIGH TEMPERATURE WATER.....	404
<i>X. Lou, P. Andresen, T. Lian</i>	
EFFECT OF BWR ENVIRONMENT ON THE FRACTURE TOUGHNESS OF ALLOY X-750.....	426
<i>A. Jenssen, M. Konig, P. Efsing, B. Forssgren, B. Bengtsson, M. Cocco, P. Ekstrom</i>	
EVALUATION OF SCC BEHAVIOR OF MODIFIED ALLOY 718	443
<i>Y. Katayama, M. Itow, N. Tanaka</i>	
INVESTIGATION OF THE EFFECT OF PICKLING AND FE CONTENT ON THE CORROSION RESISTANCE OF NI-BASE ALLOY X-750 IN SIMULATED BWR ENVIRONMENT	458
<i>H. Lai, K. Goransson, Y. Cao, S. Tuzi, M. Thuvander, K. Stiller</i>	
EFFECTS OF DENDRITE ORIENTATION AND WATER CHEMISTRY ON STRESS CORROSION CRACKING PATH AND KINETICS OF ALLOY 182 WELD METAL IN HIGH TEMPERATURE WATER	475
<i>Z. Lu, T. Shoji</i>	

BWR SCC AND WATER CHEMISTRY #3

CORROSION KINETICS OF NICKEL-BASE ALLOYS IN SIMULATED BWR CONDITIONS UNDER HIGH FLOW VELOCITY	486
<i>C. Gustafsson, J. Chen, H. Arwin, B. Forssgren</i>	
EFFECT OF FLOW AND SURFACE STRUCTURE ON THE PT DEPOSITION ON STAINLESS STEEL DURING SIMULATED NOBLE METAL APPLICATIONS	502
<i>P. Grundler, A. Ramar, L. Velea, I. Gunther-Leopold, S. Ritter</i>	
THE EFFECTS OF DISSOLVED OXYGEN DEPLETION ON BWR EXTERNAL SAMPLE LINE ECP MEASUREMENTS AND THE NEED FOR DISSOLVED OXYGEN ADDITION.....	520
<i>J. Varela, H. Huie, R. Seeman, T. Caine</i>	
EFFECTS OF OXIDE FILMS ON CORROSION PROPERTIES OF BWR STRUCTURAL MATERIALS IN HIGH TEMPERATURE-HIGH PURITY WATER	537
<i>M. Tachibana, K. Ishida, Y. Wada, R. Shimizu, N. Ota</i>	
INFLUENCE OF ULTRAVIOLET IRRADIATION ON THE CORROSION BEHAVIOR OF ZRO2-TREATED TYPE 304 STAINLESS STEELS IN HIGH TEMPERATURE WATER WITH THE PRESENCE OF HYDROGEN PEROXIDE	551
<i>C.-Y. Lie, T.-K. Yeh, M.-Y. Wang</i>	
AN INVESTIGATION ON THE ELECTROCHEMICAL CHARACTERISTICS OF TIO2-TREATED TYPE 304 STAINLESS STEELS IN HYDROGEN-RICH PURE WATER.....	566
<i>T.-H. Li, C.-Y. Ho, K.-J. Chen, T.-K. Yeh, M.-Y. Wang</i>	

DURABILITY STUDY ON ZIRCONIUM COATINGS HYDROTHERMALLY DEPOSITED ON TYPE 304 STAINLESS STEELS IN HIGH TEMPERATURE WATER	577
<i>K.-J. Chen, T.-K. Yeh, M.-Y. Wang</i>	

CORROSION FATIGUE

THE EFFECT OF COMPLEX LOADING WAVEFORMS AND NON-ISOTHERMAL CONDITIONS ON ENVIRONMENTALLY ENHANCED FATIGUE CRACK GROWTH OF AUSTENITIC STAINLESS STEEL	591
<i>N. Platts, D. Tice, J. Stairmand, D. Swan</i>	
LOW CYCLE FATIGUE BEHAVIORS OF ALLOY 690 AND ALLOY 52M IN PWR PRIMARY WATER CONDITION.....	608
<i>C. Jang, J.-D. Hong, T. Kim, Y. Lee</i>	
ACCELERATED AND RETARDED CORROSION FATIGUE CRACK GROWTH RATES FOR 304 STAINLESS STEEL IN AN ELEVATED TEMPERATURE AQUEOUS ENVIRONMENT	613
<i>W. Mills</i>	

FAC

THE FLOW-ACCELERATED CORROSION AND HYDROGEN ABSORPTION OF MARTENSITIC STAINLESS STEEL UNDER CANDU REACTOR PRIMARY HEAT TRANSPORT SYSTEM CONDITIONS.....	646
<i>J. Smith, B. Payne</i>	
FLOW ACCELERATED CORROSION MATERIAL FORM EFFECT	659
<i>D. Smith, W. McBrine, J. Horowitz</i>	
ENVIRONMENTAL DEGRADATION OF SECONDARY SEPARATORS INSPECTION, ASSESSMENT AND PREVENTATIVE MEASURES	673
<i>N. Bruns, P. Trocki, D. Gammage, R. Persad, M. Hatley, K. Sedman, C. Hamilton</i>	
FLOW ACCELERATED CORROSION OF CARBON STEEL IN THE FEEDWATER SYSTEM OF PWR PLANTS - BEHAVIOUR OF WELDS AND WELD ASSEMBLIES - 2.....	697
<i>C. Mansour, E. Pavageau, F. Inada, K. Yoneda, R. Morita, G. Qiu, J.-L. Bretelle</i>	

FUEL CLADDING

PROBABILISTIC ASSESSMENT OF DEUTERIUM INGRESS IN ROLLED-JOINT REGIONS OF CANDU ZR-2.5%NB PRESSURE TUBES	710
<i>L. Gutkin, A. Wallace</i>	
RADIATION ENHANCED SHADOW CORROSION OF FUEL COMPONENTS IN A SIMULATED BWR WATER.....	729
<i>Y.-J. Kim, Y.-P. Lin, B. Cheng, A. Kucuk</i>	
MATERIAL SELECTION FOR FUEL CLADDING RESISTANT TO SEVERE ACCIDENT SCENARIOS.....	737
<i>B. Pint, K. Terrani, J. Keiser, M. Brady, Y. Yamamoto, L. Snead</i>	
SYNERGISTIC EFFECT OF ZINC INJECTION AND DH CONTROL ON CRUD DEPOSITION ON HEATED ZIRCALOY IN SIMULATED PWR PRIMARY WATER.....	749
<i>H. Kawamura</i>	
ENVIRONMENTAL AND MECHANICAL BEHAVIOR OF FERRITIC CHROMIUM STEELS IN HIGH TEMPERATURE WATER AND STEAM.....	767
<i>J. Flores, E. Dolley, R. Rebak</i>	
IN-SITU HYDROGEN CHARGING OF ZIRCONIUM POWDER TO STUDY ISOTHERMAL PRECIPITATION OF HYDRIDES AND DETERMINATION OF ZR-HYDRIDE CRYSTAL STRUCTURE	784
<i>T. Maimaitiyili, A. Steuwer, J. Blomquist, B. Matthew, Z. Olivier, J. Andrieux, C. Bjerken, R. Fabienne</i>	

GENERAL

FABRICATION-INDUCED WELD RESIDUAL STRESSES IN AUSTENITIC STAINLESS STEEL DRY CASK STORAGE SYSTEM CANISTERS SUSCEPTIBLE TO CHLORIDE-INDUCED STRESS CORROSION CRACKING	793
<i>J. Kusnick, S. Lyons, M. Benson, H. Rathbun</i>	
SUSCEPTIBILITY OF NICKEL ALLOYS TO ENVIRONMENTAL CRACKING IN BICARBONATE CONTAINING AQUEOUS SOLUTIONS	809
<i>N. Zadorozne, C. Giordano, R. Carranza, A. Ares, R. Rebak</i>	
OXIDATION BEHAVIOR OF AUSTENITIC STAINLESS STEELS IN SUPERCRITICAL WATER	824
<i>H. Abe, R. Suzuki, H. Mo, Y. Watanabe</i>	
REVISION 2 OF THE EPRI BORIC ACID CORROSION GUIDEBOOK	835
<i>G. White, R. Jones, J. Gorman, C. Marks, J. Collin, R. Reid</i>	
INFLUENCE OF PH, TEMPERATURE, AND SALINITY UPON ANOXIC COPPER CORROSION	846
<i>N. Senior, R. Newman, B. Abghari, P. Keech</i>	
THE EFFECT OF WELD RESIDUAL STRESS ON LIFE OF USED NUCLEAR FUEL DRY STORAGE CANISTERS	855
<i>S. Ferry, B. Black, S. Teyseyre, R. Ballinger</i>	
EFFECT OF STRESS LEVEL ON THE STRESS CORROSION CRACK INITIATION OF TYPE 304L STAINLESS STEEL EXPOSED TO SIMULATED SEA SALT	866
<i>L. Miller, T. Mintz, X. He, R. Pabalan, Y.-M. Pan, G. Oberson, D. Dunn</i>	

IRRADIATION EFFECTS AND IASCC #1

VOID SWELLING AND RESULTANT STRAINS IN THICK 304 STAINLESS STEEL COMPONENTS IN RESPONSE TO SPATIAL GRADIENTS IN NEUTRON FLUX-SPECTRA AND IRRADIATION TEMPERATURE	878
<i>F. Garner, P. Freyer, D. Porter, J. Wiest, C. Knight, B. Sencer, T. Okita, M. Sagisaka, Y. Isobe, J. Etoh, T. Matsunaga, Y. Huang, J. Wiezorek</i>	
DEVELOPMENT OF POTENTIAL RADIATION RESISTANT ALLOYS FOR USE IN LWRS	894
<i>J. Nelson, J. Gorman, R. Pathania, J. Busby</i>	
CLUSTER DYNAMICS PREDICTION OF VOID SWELLING IN AUSTENITIC STAINLESS STEELS IRRADIATED UNDER PWR AND FBR CONDITIONS	914
<i>L. Fournier, M. Zouari, A. Barbu, Y. Brechet, J. Smith, A. Demma</i>	
ASSESSMENT OF THE SWELLING EQUATION USED TO PREDICT SWELLING OF AISI 304 STAINLESS STEEL IN LWR AND LMR ENVIRONMENTS	926
<i>F. Garner</i>	
REDUCTION OF IRRADIATION CREEP IN COLD-WORKED 316 STAINLESS STEEL BY COMPOSITIONAL MODIFICATION	946
<i>J. Foster, T. Karlsen</i>	
PHASE STABILITY OF HIGHLY IRRADIATED AUSTENITIC ALLOYS DURING DEFORMATION	957
<i>M. Gussev, J. Busby, T. Byun, L. Tan</i>	
INFLUENCE OF DUAL BEAM NICKEL AND HELIUM IRRADIATION ON THE MICROSTRUCTURE OF A 304L AUSTENITIC STAINLESS STEEL	972
<i>C. Duhamel, A. Barbu, J. Crepin, B. Decamps, L. Fournier, M. Le Millier, M. Sennour</i>	
MICROSTRUCTURAL EVOLUTION OF TYPE 304 VARIANTS AND 316 STAINLESS STEELS UNDER NEUTRON IRRADIATION	987
<i>L. Tan, K. Field, M. Gussev, J. Busby</i>	

IRRADIATION EFFECTS AND IASCC #2

MICROSTRUCTURAL CHARACTERIZATION OF IRRADIATED BAFFLE BOLTS REMOVED FROM A FINNISH VVER AND A FRENCH PWR	994
<i>J. Pakarinen, U. Ehrnsten, H. Keinanen, W. Karlsen</i>	
DEGRADATION OF NI-ALLOY COMPONENTS IN CANDU REACTOR CORES	1008
<i>M. Griffiths, G. Bickel, S. Donohue, P. Feenstra, C. D. Judge, D. Poff, L. Walters, M. Wright, L. Greenwood, F. Garner</i>	

DEFORMATION LOCALIZATION IN HIGHLY IRRADIATED AUSTENITIC STAINLESS STEELS	1031
<i>M. Gussev, J. Busby</i>	
EFFECT OF DOSE RATE ON DEFORMATION BEHAVIOR OF NEUTRON IRRADIATED AUSTENITIC STAINLESS STEELS.....	1043
<i>K. Kondo, Y. Kaji, H. Ugachi, J. Nakano, T. Tsukada</i>	
EXAMINATION OF BAFFLE-FORMER BOLTS FROM D.C. COOK UNIT 2.....	1056
<i>J. McKinley, R. Lott, B. Hall, K. Kalchik</i>	
TEM RADIATION DAMAGE INVESTIGATION OF NEUTRON IRRADIATED BAFFLE-TO-FORMER BOLT EXTRACTED FROM THE DECOMMISSIONED VVER-440 REACTOR VESSEL INTERNALS.....	1076
<i>J. Michalicka, A. Hojna, E. Keilova, J. Kocik</i>	

IRRADIATION EFFECTS AND IASCC #3

PROGRESSION OF LOCAL STRAIN STATES AT DISLOCATION CHANNEL-GRAIN BOUNDARY INTERSECTIONS AND THEIR RELATION TO IASCC IN AUSTENITIC STEELS.	1093
<i>M. McMurtrey, G. Was</i>	
THE EFFECT OF IN-SITU PROTON IRRADIATION ON THE CORROSION OF 316L STAINLESS STEEL	1103
<i>S. Raiman, P. Wang, G. Was</i>	
POST-IRRADIATION ANNEALING IN MITIGATION OF IASCC IN PROTON-IRRADIATED STAINLESS STEEL	1121
<i>Z. Jiao, Y. Chen, J. Hesterberg, E. Marquis, G. Was</i>	
INTERGRANULAR FRACTURE AND FRACTURE TOUGHNESS OF IRRADIATED AUSTENITIC STAINLESS STEELS OF REACTOR CORE INTERNALS	1129
<i>A. Hojna</i>	
THE RELATIONSHIP BETWEEN DISLOCATION CHANNELING AND IASCC IN NEUTRON IRRADIATED STAINLESS STEEL	1147
<i>K. Stephenson, G. Was</i>	
INFLUENCE OF STRAIN LOCALIZATION ON IASCC OF PROTON-IRRADIATED 304L STAINLESS STEEL IN SIMULATED PWR PRIMARY WATER.....	1155
<i>M. Le Millier, O. Calonne, J. Crepin, C. Duhamel, L. Fournier, F. Gaslain, E. Heripre, O. Toader, Y. Vidalenc, G. Was</i>	

IRRADIATION EFFECTS AND IASCC #4

CRACK GROWTH BEHAVIOR OF NEUTRON IRRADIATED AUSTENITIC ALLOYS WITH SOLUTE ADDITIONS	1171
<i>Y. Ashida, P. Andresen, G. Was</i>	
FRACTURE TOUGHNESS ESTIMATION OF IRRADIATED AUSTENITIC STAINLESS STEELS USING CRITICAL STRETCHED ZONE WIDTH AND TENSILE PROPERTIES	1178
<i>T. Torimaru, M. Sugiyama, S. Tanaka</i>	
STUDIES OF CRACK GROWTH RATES IN IRRADIATED STAINLESS STEEL CONTROL BLADE MATERIALS TESTED IN HIGH TEMPERATURE WATER	1190
<i>R. Horn, R. Hosler, P. Chou, P. Andresen</i>	
INSIGHTS INTO THE IASCC MECHANISM IN NEUTRON IRRADIATED AUSTENITIC ALLOYS WITH VARYING MICROSTRUCTURE AND MICROCHEMISTRY	1200
<i>G. Was, K. Stephenson, Y. Ashida</i>	
CRACK GROWTH BEHAVIOR OF IRRADIATED 304L SS IN PWR ENVIRONMENT	1215
<i>Y. Chen, B. Alexandreanu, K. Natesan, A. Rao</i>	
CRACKING OF IRRADIATED CAST STAINLESS STEELS IN LOW CORROSION POTENTIAL ENVIRONMENTS	1227
<i>Y. Chen, B. Alexandreanu, K. Natesan, A. Rao</i>	

PLANT OPERATING EXPERIENCE

LEAK IN CONTROL ROD DRIVE MECHANISM HOUSING, PALISADES NUCLEAR PLANT	1240
<i>D. Alley, P. Deniston, J. Hyres</i>	
AGEING DEGRADATION OF A HARD-FACING ALLOY AFTER LONG-TIME EXPOSURE TO BWR CONDITIONS	1257
<i>P. Aaltonen, U. Ehrnsten, P. Karjalainen-Roikonen, J.-M. Autio, T. Saukkonen, H. Hanninen</i>	
LABORATORY ANALYSIS OF A LEAKING CRDM HOUSING FROM PALISADES.....	1269
<i>J. Hyres, P. Deeds, R. Tiffany, P. Deniston, R. Smith, G. Licina, P. Riccardella, D. Alley</i>	
LABORATORY ANALYSIS OF TWO LEAKING DECONTAMINATION PORTS.....	1289
<i>F. Habib, J. Hyres, H. Xu</i>	
LABORATORY ANALYSIS OF A LEAKING TUBE-TO-TUBE ADAPTER.....	1305
<i>C. Friant, J. Hyres, H. Xu</i>	
GALVANIC CORROSION OF RUBBER LINED SERVICE WATER PIPES ADJACENT TO TITANIUM HEAT EXCHANGERS	1318
<i>R. Matthews</i>	
SHERLOCK PROJECT - INVESTIGATE TO MITIGATE	1327
<i>M. Boccanfuso, J. Van Der Lee</i>	
PRESSURIZER HEATER FAILURE EXAMINATION	1342
<i>A. Ruminski, B. Lisowyj</i>	
INVESTIGATIONS OF LEAKAGE FROM A CONTROL ROD DRIVE MECHANISM HOUSING	1360
<i>G. Licina, R. Smith, P. Riccardella, P. Deeds, R. Tiffany, P. Deniston, J. Hyres</i>	
MRP-227 REACTOR VESSEL INTERNALS INSPECTION PLANNING AND INITIAL RESULTS AT THE OCONEE NUCLEAR STATION.....	1377
<i>S. Fyftch, S. Davidsaver, D. Whitaker, R. Doss</i>	

PWR PRIMARY SCC #1

TOWARDS A MECHANISTIC UNDERSTANDING OF THE INFLUENCE OF THERMO-MECHANICAL TREATMENT ON CRACK INITIATION IN HIGH TEMPERATURE PWR ENVIRONMENTS	1391
<i>S. Nouraei, D. Tice</i>	
INITIATION OF STRESS CORROSION CRACKING IN PRE-STRAINED AUSTENITIC STAINLESS STEELS EXPOSED TO PRIMARY WATER.....	1414
<i>P. Huguenin, J. Crepin, C. Duhamel, H. Proudhon, F. Vaillant</i>	
RESULTS FROM SYSTEMATIC COMPILATION OF BARREL BOLT FINDINGS IN S/KWU TYPE PWRs IN THE CONTEXT OF COMPUTATIONAL ANALYSIS AND LABORATORY RESULTS GAINED FROM COLD WORKED TYPE 316 TI UNDER SIMULATED PWR PRIMARY ENVIRONMENT	1434
<i>B. Devrient, R. Kilian, G. Konig, E. Nowak, M. Widera</i>	
ELECTROCHEMICAL STUDIES OF THE EFFECT OF SOLUTION IMPURITIES ON THE ONSET OF STRESS CORROSION CRACKING OF AUSTENITIC STAINLESS STEEL IN PWR PRIMARY WATER.....	1454
<i>F. Bocher, T. Mintz</i>	
REVIEW OF STRESS CORROSION CRACKING OF PRESSURE BOUNDARY STAINLESS STEEL IN PWRs AND THE NEED FOR LONG-TERM INDUSTRY GUIDANCE	1468
<i>R. Hosler, S. Fyftch, H. Malikowski, G. Ilevbare</i>	
FORMATION MECHANISMS AND PROPERTIES OF OXIDE LAYERS FORMED ON 316L ALLOY IN SIMULATED PWR ENVIRONMENT	1486
<i>R. Soulasx, L. Legras, M. Cheynet, Y. Brechet</i>	

PWR PRIMARY SCC #2

SCC GROWTH RATE OF TESTING OF STAINLESS STEEL IN AERATED WATER WITH AND WITHOUT ANION IMPURITIES	1507
<i>D. Morton</i>	
STRESS CORROSION CRACK GROWTH OF TYPE 316L STAINLESS STEEL IN CHLORIDE AND SULFATE CONTAMINATED OXYGENATED WATER.....	1532
<i>D. Tice, T. Brown, J. Stairmand, S. Nouraei, M. Wright</i>	

PREFERABLE SLIP PLANE FOR THE INITIATION OF TRANSGRANULAR STRESS CORROSION CRACKING OF COLD- ROLLED TYPE316L STAINLESS STEEL IN SIMULATED PRIMARY WATER ENVIRONMENT	1550
<i>S. Fujimoto, N. Okada, T. Saito, H. Tsuchiya</i>	
STRESS CORROSION CRACKING SUSCEPTIBILITY OF STRAIN HARDENED 316 STAINLESS STEEL IN SIMULATED PWR PRIMARY WATER.....	1556
<i>T. Yonezawa, Y. Miyahara, A. Hashimoto</i>	
SCC CRACK GROWTH RATES OF COLD-WORKED AUSTENITIC STAINLESS STEELS IN LABORATORY PRIMARY ENVIRONMENT	1568
<i>L. Zhang, D. Du, L. Yu, K. Chen, K. Yin</i>	
A MODIFIED FILM-RUPTURE MECHANISM TO EXPLAIN STRESS CORROSION CRACKING IN 304 STAINLESS STEEL	1578
<i>K. Kruska, D. Saxey, T. Terachi, T. Yamada, G. Smith, S. Lozano-Perez</i>	

PWR PRIMARY SCC #3

EVALUATION OF THE SUSCEPTIBILITY TO PWSCC OF NICKEL-BASE WELD METALS WITH THE SLOW STRAIN RATE TENSILE TESTS ON HUMP-TYPE SPECIMENS	1593
<i>Y. Sakakibara, G. Nakayama, T. Hirano</i>	
INITIATION OF SCC CRACK IN NICKEL BASED WELD METALS: INFLUENCE OF MICROSTRUCTURAL FEATURES.....	1606
<i>E. Chaumun, J. Crepin, I De Curieres, C. Duhamel, C. Guerre, E. Heripre, M. Sennour</i>	
SCC TESTING OF ALLOY 600 DIVIDER PLATES FROM DECOMMISSIONED STEAM GENERATORS	1624
<i>A. Jenssen, M. Konig, D. Deforge, S. Miloudi, E. Le Maire, F. Vaillant</i>	
PRIMARY WATER STRESS CORROSION CRACKING TESTS AND METALLURGICAL ANALYSES OF DAVIS-BESSE CONTROL ROD DRIVE MECHANISM NOZZLE #4	1639
<i>D. Dunn, J. Collins, D. Alley, B. Alexandreanu, S. Bruemmer, M. Toloczko</i>	
IGSCC GROWTH OF COLD ROLLED NI-CR-FE ALLOYS IN PWR PRIMARY WATER.....	1652
<i>K. Arioka, T. Yamada, T. Miyamoto, M. Aoki</i>	
A REVIEW OF ALLOY 600 AND ALLOY 182 PWSCC IN CRDM NOZZLES AND WELDS IN PWRS AND FUTURE EXPECTATIONS.....	1671
<i>S. Fyfitsh, L. Fournier, C. Benhamou</i>	
PWSCC INITIATION MODELING FOR THE EXTREMELY LOW PROBABILITY OF RUPTURE (XLPR) CODE	1684
<i>S. Fyfirsh, C. Harrington</i>	

PWR PRIMARY SCC #4

RETARDATION OF STRESS CORROSION CRACKING IN HTH ALLOY X-750 BY PRESTRAIN	1698
<i>W. Mills, M. Lebo, J. Kearns</i>	
HYBRID SCC MODELS FOR NICKEL ALLOY WELDS IN PWR PRIMARY WATER	1719
<i>E. Eason, G. Ilevbare, R. Pathania</i>	
AN ASSESSMENT OF SCC INITIATION MODEL FOR NICKEL-BASE AND AUSTENITIC STAINLESS STEEL MATERIALS IN LIGHT WATER REACTOR ENVIRONMENTS.....	1732
<i>Y. Garud, G. Ilevbare</i>	
INITIATION OF PWSCC OF WELD ALLOY 182.....	1745
<i>T. Couvant, M. Wehbi, C. Duhamel, J. Crepin</i>	
DEVELOPMENT OF A MICROSTRUCTURALLY FAITHFUL MESO-SCALE MODEL OF LOW TEMPERATURE CRACK PROPAGATION IN ALLOY 82 WELD METAL	1752
<i>G. Klimaytys, A. Jivkov, D. Engelberg</i>	

PWR PRIMARY SCC #5

CHARACTERISATION OF STRESS CORROSION CRACKING AND INTERNAL OXIDATION OF ALLOY 600 IN HIGH TEMPERATURE HYDROGENATED STEAM	1761
<i>J. Lindsay, F. Scenini, X. Zhou, G. Bertali, R. Cottis, M. Burke, F. Carrette, F. Vaillant</i>	
GRAIN BOUNDARY CHARACTERIZATION OF ALLOY 600 PRIOR TO AND AFTER CORROSION BY ATOM PROBE TOMOGRAPHY AND TRANSMISSION ELECTRON MICROSCOPY	1778
<i>D. Schreiber, M. Olszta, L. Thomas, S. Bruemmer</i>	
ATOM-PROBE TOMOGRAPHY OF SURFACE AND GRAIN BOUNDARY OXIDES IN ALLOY 600 AND ALLOY 690 EXPOSED TO SIMULATED PWR PRIMARY WATER	1796
<i>K. Kruska, P. Chou, O. Calonne, L. Fournier, S. Lozano-Perez</i>	
ALLOY 690 SURFACE NANOSTRUCTURES DURING EXPOSURE TO PWR PRIMARY WATER AND POTENTIAL INFLUENCE ON STRESS CORROSION CRACK INITIATION.....	1805
<i>M. Olszta, D. Schreiber, M. Toloczko, S. Bruemmer</i>	
REVIEWING THE INTERNAL OXIDATION MECHANISM AS A PLAUSIBLE EXPLANATION FOR SCC IN PWR PRIMARY WATER	1824
<i>S. Lozano-Perez, M. Meisnar, J. Dohr, K. Kruska</i>	
GRAIN BOUNDARY EMBRITTLEMENT OF ALLOY 600 BY INTERNAL OXIDATION IN SIMULATED PRIMARY WATER ENVIRONMENTS	1833
<i>S. Persaud, R. Newman, A. Carcea, G. Botton, J. Huang, A. Korinek, S. Ramamurthy</i>	
CHARACTERIZATION OF OXIDE FILMS ON ALLOYS 600 AND 690 EXPOSED TO SUPERCRITICAL AND SUBCRITICAL WATER	1849
<i>L. He, G. Cao, K. Sridharan, T. Alen, T. Moss, G. Was, T. Lian</i>	

PWR PRIMARY SCC #6

3D ANALYSIS OF SURFACE TREATMENT EFFECTS ON THE OXIDATION OF GRAIN BOUNDARIES IN ALLOY 600	1870
<i>R. Morris, N. Lewis, D. Morton</i>	
OXIDE FILMS ON NICKEL-BASE ALLOYS IN WATER AT 360° C UNDER PWR ENVIRONMENT	1891
<i>T. Ohtsuka, Y. Hamaguchi, M. Sakairi, K. Fushimi, K. Azumi, Y. Sakaibara, G. Nakayama</i>	
NOVEL SEM CHARACTERIZATION OF SCC THROUGH LOW-KEV EDX	1904
<i>M. Meisnar, S. Lozano-Perez, M. Moody, J. Holland</i>	

PWR PRIMARY SCC #7

PBSCC OF ALLOY 690TT AND ALLOY 800NG STEAM GENERATOR TUBING IN ALKALINE CONDITIONS	1916
<i>R. Wolfe, R. Eaker, J. Lumsden</i>	
STRESS CORROSION CRACKING OF ALLOY 800 IN SECONDARY SIDE CREVICE ENVIRONMENT	1935
<i>M.-L. Turi, G. Goszczynski, G. Ogundele, A. Jarvine</i>	
LONG-TERM WET LAY-UP STRATEGY AND CHEMISTRY TRENDS FOR THE CRYSTAL RIVER-3 REPLACEMENT ONCE-THROUGH STEAM GENERATORS DURING AN EXTENDED OUTAGE.....	1951
<i>R. Thompson, J. Jevic</i>	
LEAD INDUCED CORROSION IN SG TUBING MATERIALS	1970
<i>E. Aublant, O. Calonne, M. Foucault, I. De Curières</i>	
A THEORY FOR THE ROLE OF LINE CONTACT CREVICES AND THEIR CHEMISTRIES IN PROMOTING SCC IN ALLOY 690	1984
<i>X. Ru, R. Staehle</i>	

PWR SECONDARY SIDE

EFFECTS OF LASER SHOCK PEENING ON SCC BEHAVIOR OF ALLOY 600	2038
<i>A. Telang, C. Ye, A. Gill, S. Teyseyre, S. Mannava, D. Qian, V. Vasudevan</i>	
EFFECTS OF CAUSTIC CORROSION ON THE LOCAL STRAIN DISTRIBUTION AND CRACK INITIATION BEHAVIOUR OF UNSTRESSED AND STRESSED ALLOY 600	2053
<i>J. Ulaganathan, A. Carcea, N. McIntyre, R. Newman</i>	

RPV SCC AND EMBRITTLEMENT

U.S. HIGH FLUENCE POWER REACTOR SURVEILLANCE DATA - PAST AND FUTURE	2068
<i>W. Server, T. Hardin, J. Hall, R. Nanstad</i>	
EFFECTS OF MICROSTRUCTURE ON STRESS CORROSION CRACKING IN HEAT AFFECTED ZONE OF ALLOY 182-A533B DISSIMILAR WELD JOINT UNDER BWR CONDITIONS	2080
<i>Z. Zhai, Y. Watanabe, A. Hiroshi</i>	
EFFECT OF STRENGTH MISMATCH AND MICROSTRUCTURE ON MECHANICAL PROPERTIES OF BWR DISSIMILAR METAL SAFE-END WELD	2092
<i>P. Holmstrom, T. Sarikka, A. Brederholm, P. Karjalainen-Roikonen, T. Saukkonen, P. Nevasmaa, H. Hanninen</i>	
EFFECTS OF ULTRASONIC NANOCRYSTAL SURFACE MODIFICATION ON RESIDUAL STRESS, MICROSTRUCTURE AND LOCAL PROPERTIES OF WELDED 304 STAINLESS STEEL	2110
<i>C. Ye, A. Telang, A. Gill, Z. Zhou, S. Mannava, D. Qian, V. Vasudevan</i>	
SCC BEHAVIOUR IN THE TRANSITION REGION OF ALLOY 182/ LOW-ALLOY REACTOR PRESSURE VESSEL STEEL DISSIMILAR METAL WELD JOINTS IN LIGHT WATER REACTOR ENVIRONMENTS	2119
<i>H.-P. Seifert, S. Ritter, H. Leber, S. Roychowdhury</i>	
EFFECTS OF CHLORIDE ON THE EAC-BEHAVIOR OF LOW-ALLOW STEELS IN OXYGENATED HIGH-TEMPERATURE WATER	2152
<i>M. Herbst, A. Roth, M. Widera, E. Nowak</i>	
CLEAVAGE FRACTURE IN FERRITIC STEEL WELD: CHARACTERIZATION OF SECOND PHASE PARTICLES	2173
<i>S. Schilling, N. Chapeau, A. Jivkov, E. Keim, S. Ortner, M. Burke</i>	
BEHAVIOR OF HEAT-AFFECTED ZONE REACTOR PRESSURE VESSEL	2186
<i>G. Troyer, M. Erickson</i>	
Author Index	