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Contents

PREFACE xv

ACKNOWLEDGMENTS xvii

MATERIALS RESEARCH SOCIETY SYMPOSIUM PROCEEDINGS xx

KEYNOTE ADDRESS

*THE CHEMICAL BEHAVIOR OF TRANSURANIUM ELEMENTS AND BARRIER FUNCTIONS IN NATURAL AQUIFER SYSTEMS 3
Jae-Il Kim

PART I: SPENT FUEL

KINEMATICS AND THERMODYNAMICS OF NON-STOICHIOMETRIC OXIDATION PHASE TRANSITIONS IN SPENT FUEL 25
R.B. Stout, E.J. Kansa, and A.M. Wijesinghe

ELECTROCHEMICAL STUDIES OF CORROSION OF SIMFUEL: SIMULATED USED UO_2 FUEL 35
S. Sunder, D.W. Shoesmith, and N.H. Miller

MEASUREMENTS OF GRAIN-BOUNDARY INVENTORIES OF ^{137}Cs, ^{90}Sr and ^{99}Tc IN USED CANDU FUEL 41
S. Stroes-Gascoyne, J.C. Tait, R.J. Porth, J.L. McConnell, T.R. Barnsdale, and S. Watson

EFFECTS OF AIR OXIDATION ON THE DISSOLUTION RATE OF LWR SPENT FUEL 47
W.J. Gray, L.E. Thomas, and R.E. Einziger

PHOTOTHERMAL DEFLECTION SPECTROSCOPY INVESTIGATIONS OF URANIUM ELECTROCHEMISTRY 55
James D. Rudnicki and Richard E. Russo

KINETICALLY CONTROLLED DISSOLUTION OF UO_2(s) UNDER OXIDIZING CONDITIONS. A COMBINED DISSOLUTION-OXIDATION MODEL 61
Ignasi Casas, J. Gimenez, V. Marti, M.E. Torrero, and J. De Pablo

DISSOLUTION OF UO_2(s) IN $MgCl_2$-BRINES UNDER DIFFERENT REDOX CONDITIONS 67
Ignasi Casas, J. Gimenez, J. De Pablo, and M.E. Torrero

THE IMPORTANCE OF CRITICALITY IN THE SAFETY ANALYSIS OF THE SPENT-FUEL WASTE CONTAINER 73
William G. Culbreth and Paige Zielinski

PART II: GLASS AND CRYSTALLINE WASTE FORMS

INITIAL DEMONSTRATION OF THE VITIRIFICATION OF HIGH-LEVEL NUCLEAR WASTE SLUDGE CONTAINING AN ORGANIC Cs-LOADED ION-EXCHANGE RESIN 81
N.E. Bibler, J.P. Bibler, M.K. Andrews, and C.M. Jantzen

*Invited Paper

REDOX SYSTEMATICS IN MODEL GLASS COMPOSITIONS FROM WEST VALLEY 87
Henry D. Schreiber, Charlotte W. Schreiber, and Cary C. Ward

LEACH RESISTANCE PROPERTIES AND RELEASE PROCESSES FOR SALT-OCCLUDED ZEOLITE A 95
M.A. Lewis, D.F. Fischer, and J.J. Laidler

CATALYTIC EFFECT OF SOME OXIDES ON CALCINATION OF SODIUM NITRATE 103
A.N. Sembira and M.M. Perez

QUANTITATIVE X-RAY DIFFRACTION ANALYSIS OF TITANATE WASTE FORMS AND ITS APPLICATION TO DAMAGE INGROWTH 109
T.J. White and H. Mitamura

FUNDAMENTAL STUDY ON THE SOLIDIFICATION OF Cs^{+} AND Sr^{2+} WITH HYDROUS Ti^{IV} OXIDE MODIFIED WITH Si AND Zr 117
Y. Inoue, H. Yamazaki, and R. Erza

INCORPORATION OF RADIONUCLIDES INTO MINERAL PHASES VIA A THERMALLY UNSTABLE COMPLEXANT LIGAND 123
Allen W. Apblett, Galina D. Georgieva, and Joel T. Mague

URANIUM AND RARE EARTH PARTITIONING IN SYNROC 129
K.L. Smith, G.R. Lumpkin, and M.G. Blackford

THE REACTION OF SRL 202 GLASS IN J-13 AND DIW 137
W.L. Ebert, J.K. Bates, and E.C. Buck

PART III: GLASS PERFORMANCE: MECHANISMS AND MODELS

THE LEACHING OF Pu, Am, Np AND Tc FROM HIGH-LEVEL WASTE GLASSES IN CLAY MEDIA 147
K. Lemmens, P. Van Iseghem, and L. Wang

PLUTONIUM LEACHING FROM A REFERENCE NUCLEAR WASTE GLASS IN SYNTHETIC INTERSTITIAL CLAYWATER 155
Lian Wang, P. Van Iseghem, and A. Maes

ENHANCEMENT OF THE GLASS CORROSION IN THE PRESENCE OF CLAY MINERALS: TESTING EXPERIMENTAL RESULTS WITH AN INTEGRATED GLASS DISSOLUTION MODEL 163
Enzo Curti, N. Godon, and E.Y. Vernaz

DISSOLUTION OF R7T7 GLASS IN STATIC AND FLOWING CONDITIONS: INFLUENCE OF Si DIFFUSION MECHANISM IN THE LEACHED LAYER 171
F. Delage, F. Larche, and E. Vernaz

EFFECTS OF MgO ON THE SHORT- AND LONG-TERM STABILITY OF R7T7 AND M7 NUCLEAR WASTE GLASS ON AQUEOUS MEDIA 177
T. Advocat, J.L. Crovisier, J.L. Dussossoy, and E. Vernaz

EFFECTS OF RADIATION EXPOSURE ON GLASS ALTERATION IN A STEAM ENVIRONMENT 183
D.J. Wronkiewicz, L.M. Wang, J.K. Bates, and B.S. Tani

EFFECTS OF α-DECAY ON MECHANICAL PROPERTIES OF SIMULATED NUCLEAR WASTE GLASS 191
Y. Inagaki, H. Furuya, Y. Ono, K. Idemitsu, T. Banba, S. Matsumoto, and S. Muraoka

ANALYTICAL ELECTRON MICROSCOPY STUDY OF COLLOIDS FROM NUCLEAR WASTE GLASS REACTION 199
E.C. Buck, J.K. Bates, J.C. Cunnane, W.L. Ebert, X. Feng, and D.J. Wronkiewicz

DOES FULLY RADIOACTIVE GLASS BEHAVE DIFFERENTLY THAN SIMULATED WASTE GLASS? 207
X. Feng, J.K. Bates, C.R. Bradley, and E.C. Buck

COUPLED PROCESS MODELING AND WASTE-PACKAGE PERFORMANCE 215
B.P. McGrail and D.W. Engel

HIGH-LEVEL NUCLEAR-WASTE BOROSILICATE GLASS: A COMPENDIUM OF CHARACTERISTICS 225
J.C. Cunnane, J.K. Bates, W.L. Ebert, X. Feng, J.J. Mazer, D.J. Wronkiewicz, J. Sproull, W.L. Bourcier, and B.P. McGrail

PART IV: CEMENTITIOUS MATERIALS

EVALUATION OF SOME LOW-ACTIVATION STRUCTURAL MATERIALS FOR MINIMIZING RADIOACTIVE WASTE PRODUCTION BY FUTURE NUCLEAR FUSION POWER PLANTS 235
Aldo Donato

EFFECTS OF RELATIVE SURFACE AREA AND LEACHANT COMPOSITION ON THE ^{137}Cs LEACH RATE FROM CEMENT WASTE FORMS 241
Aleksandar D. Peric, Ilija B. Plecas, and Snezana D. Glodic

THE ROLE OF OXYGEN DIFFUSION IN THE RELEASE OF TECHNETIUM FROM REDUCING CEMENTITIOUS WASTE FORMS 247
Robert W. Smith and John C. Walton

ALKALI-ACTIVATED FLY ASH-SLAG CEMENT BASED NUCLEAR WASTE FORMS 255
W. Jiang, X. Wu, and D.M. Roy

*THE POSSIBILITY FOR MICROBIALLY INFLUENCED DEGRADATION OF CEMENT SOLIDIFIED LOW-LEVEL RADIOACTIVE WASTE FORMS 261
Robert D. Rogers, Melinda A. Hamilton, and John W. McConnell

EFFECTS OF MICROORGANISMS GROWTH ON THE LONG-TERM STABILITY OF CEMENT AND BITUMEN 267
Marie F. Libert, R. Sellier, G. Jouquet, M. Trescinski, and H. Spor

BORATE SUBSTITUTED ETTRINGITES 273
Laszlo J. Csetenyi and F.P. Glasser

MOBILITY OF CHELATED RADIONUCLIDES IN ENGINEERED CONCRETE BARRIERS 279
Craig A. Dicke and Robert W. Smith

THE RADIATION STABILITY OF GROUND GRANULATED BLAST FURNACE SLAG/ORDINARY PORTLAND CEMENT GROUTS CONTAINING ORGANIC ADMIXTURES 285
John D. Palmer and Graham A. Fairhall

IN-SITU ELECTROCHEMICAL CHARACTERIZATION OF GROUTED RADIOACTIVE WASTE 291
Albert A. Kruger, Jingyan Gu, and Micha Tomkiewicz

*Invited Paper

USE OF FLY-ASH FOR SEALING A RADIOACTIVE WASTE REPOSITORY 297
Marc Ollagnier, Christian Tauziede, and Joël Olivier

SOLIDIFICATION OF MICROBIOLOGICALLY TREATED ION-EXCHANGE RESINS USING PORTLAND CEMENT-BASED SYSTEMS 303
Ari Ipatti

PART V: CONTAINER ALTERATION

CREVICE CORROSION—NaCl CONCENTRATION MAP FOR GRADE-2 TITANIUM AT ELEVATED TEMPERATURE 311
Shigeo Tsujikawa and Yoichi Kojima

CORROSION OF STAINLESS STEEL FOR HLW CONTAINERS UNDER GAMMA IRRADIATION 317
K. Osada and S. Muraoka

EFFECTS OF CHLORIDE, BROMIDE, AND THIOSULFATE IONS ON THE CRITICAL CONDITIONS FOR CREVICE CORROSION OF SEVERAL STAINLESS ALLOYS AS A MATERIAL FOR GEOLOGICAL DISPOSAL PACKAGES FOR NUCLEAR WASTE 323
Guen Nakayama, Hisao Wakamatsu, and Masatsune Akashi

CRITICAL CONDITIONS FOR INITIATION OF LOCALIZED CORROSION OF MILD STEELS IN CONTACT WITH BENTONITE USED IN GEOLOGICAL DISPOSAL PACKAGES OF NUCLEAR WASTE 329
Guen Nakayama and Masatsune Akashi

LABORATORY STUDIES OF GAS GENERATION FOR THE WASTE ISOLATION PILOT PLANT 335
L.H. Brush, M.A. Molecke, R.E. Westerman, A.J. Francis, J.B. Gillow, R.H. Vreeland, and D.T. Reed

PART VI: MICROBIOLOGICALLY INFLUENCED CORROSION

*RECENT ADVANCES IN THE STUDY OF MICROBIOLOGICALLY INFLUENCED CORROSION 343
Brenda Little and Patricia Wagner

SUSCEPTIBILITY OF STAINLESS STEEL WELDMENTS TO MICRO-BIOLOGICALLY INFLUENCED CORROSION 353
Susan Watkins Borenstein

PRINCIPLES OF THE SELECTION OF EFFECTIVE AND ECONOMIC CORROSION-RESISTANT ALLOYS IN CONTACT WITH BIOLOGICALLY ACTIVE ENVIRONMENTS 361
Nicholas J.E. Dowling, Carl Lundin, Dan Sachs, Jan A. Bullen, and David C. White

*THE USE OF IMAGE ANALYSIS IN LONG-TERM NONDESTRUCTIVE CORROSION MONITORING OF NUCLEAR ALLOYS 369
P.J.B. Scott, S. Sandloehken, and Gerard Guerin

USE OF SPUTTER-DEPOSITED 316L STAINLESS STEEL ULTRATHIN FILMS FOR MICROBIAL INFLUENCED CORROSION STUDIES 381
P.A. Suci, A.J. Pedraza, M.J. Godbole, and G.G. Geesey

*Invited Paper

PART VII: NEAR-FIELD INTERACTIONS

DEALING WITH UNCERTAINTY IN THE CHEMICAL ENVIRONMENT IN BENTONITE BACKFILL 389
R.C. Arthur, M.J. Apted, and J.L. Conca

AQUEOUS DIFFUSION IN REPOSITORY AND BACKFILL ENVIRONMENTS 395
James L. Conca, Mick Apted, and Randy Arthur

STUDY ON RETARDATION MECHANISM OF ^{3}H, ^{99}Tc, ^{137}Cs, ^{237}Np AND ^{241}Am IN COMPACTED SODIUM BENTONITE 403
H. Sato, T. Ashida, Y. Kohara, and M. Yui

DIFFUSION OF URANIUM IN COMPACTED SODIUM BENTONITE 409
Arto Muurinen, Kaija Ollila, and Jarmo Lehikoinen

TEMPERATURE AND MOISTURE DISTRIBUTIONS IN A CLAY BUFFER MATERIAL DUE TO THERMAL GRADIENTS 417
A.M.O. Mohamed, R.N. Yong, and B. Kjartanson

MOISTURE ADSORPTION AND VOLUME CHANGE OF PARTIALLY SATURATED BENTONITE BUFFER MATERIALS 425
Takeshi Kanno and Hisao Wakamatsu

RADIOLYTICALLY-INDUCED GAS PRODUCTION IN PLUTONIUM-SPIKED WIPP BRINE 431
D.T. Reed, S. Okajima, L.H. Brush, and M.A. Molecke

ANALYSIS OF EVAPORATION IN NUCLEAR WASTE BOREHOLES IN UNSATURATED TUFF 439
W. Zhou, P.L. Chambré, T.H. Pigford, and W.W.-L. Lee

COMPARED STUDY OF RADIOLYSIS-INDUCED GAS LIBERATION IN ROCKSALT FROM VARIOUS ORIGINS 447
N. Akram, J.C. Blanchard, M.T. Gaudez, and P. Toulhoat

RADIATION DAMAGE IN NaCl: CALCULATIONS WITH AN EXTENDED JAIN-LIDIARD MODEL 453
Wim J. Soppe and J. Prij

EVALUATION OF THE RETENTION CAPABILITY OF BACKFILL MATERIALS IN THE PRESENCE OF CEMENT WASTE FORM 459
N.K. Ghattas, K.A. El Adham, S.B. Eskander, and N.S. Mahmoud

DIFFUSION OF CORROSION PRODUCTS OF IRON IN COMPACTED BENTONITE 467
K. Idemitsu, H. Furuya, and Y. Inagaki

STUDY OF THE PERFORMANCE OF SEALING SYSTEMS FOR ACCESS SHAFTS IN A HIGH-LEVEL WASTE REPOSITORY 475
A. Saotome, K. Hara, and J. Okamoto

RESULTS FROM SIMULATED REMOTE-HANDLED TRANSURANIC WASTE EXPERIMENTS AT THE WASTE ISOLATION PILOT PLANT (WIPP) 481
Martin A. Molecke

PART VIII: NATURAL ANALOGUES

MODELLING IN-SITU MATRIX DIFFUSION AT PALMOTTU NATURAL ANALOGUE STUDY SITE IN SW FINLAND 489
Kari Rasilainen and Juhani Suksi

URANIUM MINERAL—GROUNDWATER EQUILIBRATION AT THE PALMOTTU NATURAL ANALOGUE STUDY SITE, FINLAND 497
Lasse Ahonen, H. Ervanne, T. Ruskeeniemi, T. Jaakkola, and R. Blomqvist

OXIDATIVE ALTERATION OF URANINITE AT THE NOPAL I DEPOSIT, MEXICO: POSSIBLE CONTAMINANT TRANSPORT AND SOURCE TERM CONSTRAINTS FOR THE PROPOSED REPOSITORY AT YUCCA MOUNTAIN 505
Bret W. Leslie, English C. Pearcy, and James D. Prikryl

THE ALTERATION OF URANINITE TO CLARKEITE 513
Robert J. Finch and Rodney C. Ewing

KINETIC STUDIES OF NATURAL URANIUM MINERALS FOR THE LONG-TERM EVOLUTION OF SPENT NUCLEAR FUEL UNDER OXIDIZING CONDITIONS 521
Ignasi Casas, E. Cera, and J. Bruno

A MODELLING STUDY ON THE FRACTIONATION OF URANIUM AMONG MINERALS DURING ROCK WEATHERING 527
Toshihiko Ohnuki, Takashi Murakami, and Nobuyuki Yanase

A MODELLING STUDY OF THE EFFECT OF ROCK ALTERATION ON THE REDISTRIBUTION OF URANIUM 535
Takashi Murakami and Hideo Kimura

SURFACE-DISCHARGING HYDROTHERMAL SYSTEMS AT YUCCA MOUNTAIN—EXAMINING THE EVIDENCE 543
Schön S. Levy

CORROSION MODEL VALIDATION IN HIGH LEVEL NUCLEAR WASTE PACKAGE RESEARCH 549
M.B. McNeil and J.B. Moody

PART IX: LONG-TERM PREDICTION FOR ENGINEERED BARRIERS

*THE LONG-TERM PERFORMANCE OF NUCLEAR WASTE FORMS: NATURAL MATERIALS—THREE CASE STUDIES 559
Rodney C. Ewing

ACCELERATED GLASS REACTION UNDER PCT CONDITIONS 569
W.L. Ebert, J.K. Bates, E.C. Buck, and C.R. Bradley

MODELING SURFACE AREA TO VOLUME EFFECTS ON BOROSILICATE GLASS DISSOLUTION 577
William L. Bourcier, W.L. Ebert, and X. Feng

INCREASES IN LEACH RATE DUE TO POSSIBLE CRACKING IN SILICATE GLASSES 583
J.C. Sang, A. Barkatt, I.G. Talmy, and M.K. Norr

*OBSERVATION BY SEM/EDXS OF LEACHED LAYERS ON SRL-165 GLASS FROM 5-YEAR MIIT TEST 591
Pedro B. Macedo and Andrew C. Buechele

A JUSTIFICATION FOR THE USE OF DATA FROM ACCELERATED LEACH TESTS OF GLASS 599
Tae M. Ahn, Charles G. Interrante, and Richard A. Weller

*Invited Paper

ANCIENT METALLURGY AND NUCLEAR WASTE CONTAINMENT 605
Martha Goodway

*LONG-TERM PREDICTIONS RELATING TO ENVIRONMENT SENSITIVE CRACKING 613
R.N. Parkins

THE POTENTIAL ROLE OF DIFFUSION-INDUCED GRAIN-BOUNDARY MIGRATION IN EXTENDED LIFE PREDICTION 625
C.A. Handwerker, J.E. Blendell, C.G. Interrante, and T.M. Ahn

*EXPERIMENTS AND MODELLING STUDIES CONCERNING LOCALISED CORROSION OF CARBON STEEL AND STAINLESS STEEL CONTAINERS FOR INTERMEDIATE- AND LOW-LEVEL RADIOACTIVE WASTE 637
A.R. Hoch, C.C. Naish, S.M. Sharland, A.C. Smith, and K.J. Taylor

REPASSIVATION POTENTIALS FOR LONG-TERM LIFE PREDICTION OF LOCALIZED CORROSION 649
Narasi Sridhar and Gustavo Cragnolino

PART X: PERFORMANCE ASSESSMENT OF ENGINEERED BARRIER SYSTEMS

*THE ENGINEERED BARRIER SYSTEM: PERFORMANCE ISSUES 657
T.H. Pigford

*PROGRESS IN WASTE PACKAGE AND ENGINEERED BARRIER SYSTEM PERFORMANCE ASSESSMENT AND DESIGN 663
Abraham Van Luik, David Stahl, and Diane Harrison

*SOME IMPORTANT MECHANISMS AND PROCESSES IN THE NEAR FIELD OF THE SWEDISH REPOSITORY FOR SPENT NUCLEAR FUEL 675
Ivars Neretnieks

*PERFORMANCE ASSESSMENT OF ENGINEERED BARRIERS USING THE VAULT MODEL 689
L.H. Johnson and D.M. LeNeveu

*KEY ISSUES INFLUENCING THE PERFORMANCE OF NEAR-FIELD BARRIERS 697
P.W. Tasker, S.J. Wisbey, and C.B. Boyle

*RESEARCH NEEDS IN HLW DISPOSAL PROGRAMMES 707
Joerg Hadermann and Charles McCombie

THE IAEA COORDINATED RESEARCH PROGRAMME ON THE PERFORMANCE OF HIGH-LEVEL WASTE FORMS AND PACKAGES UNDER REPOSITORY CONDITIONS 719
Vladimir S. Tsyplenkov

THE NEAR-FIELD TRANSPORT CODE TULLGARN AND ITS USE IN PERFORMANCE ASSESSMENT 725
Patrik Sellin and Nils Kjellbert

NEAR-FIELD PERFORMANCE ASSESSMENT FOR THE SALTSTONE DISPOSAL FACILITY 731
Roger R. Seitz, John C. Walton, Craig A. Dicke, and James R. Cook

*Invited Paper

PART XI: RADIONUCLIDE CHEMISTRY AND TRANSPORT

BULK SOLUBILITY AND SPECIATION OF PLUTONIUM(VI) IN PHOSPHATE-CONTAINING SOLUTIONS 739
H.T. Weger, S. Okajima, J.C. Cunnane, and D.T. Reed

EVIDENCE OF RADIOLYTIC OXIDATION OF ^{241}Am IN $Na^+/Cl^-/HCO_3^-/CO_3^{2-}$ MEDIA 747
Eric Giffaut and Pierre Vitorge

THERMODYNAMIC MODELLING OF THE EFFECT OF HYDROXY-CARBOXYLIC ACIDS ON THE SOLUBILITY OF PLUTONIUM AT HIGH pH 753
Anthony D. Moreton

A COMPARATIVE STUDY OF EUROPIUM, THORIUM AND URANIUM BINDING TO AN AQUATIC FULVIC ACID 759
M. Nordén, Y. Albinsson, J.H. Ephraim, and B. Allard

THE ROLE OF SIDEROPHORES IN THE TRANSPORT OF RADIO-NUCLIDES 765
Larry E. Hersman, Philip D. Palmer, and David E. Hobart

MICROBIAL EFFECTS ON THE RADIONUCLIDE TRANSPORT IN A DEEP NUCLEAR WASTE REPOSITORY 771
Herve Spor, M. Trescinski, and M.F. Libert

EXPERIMENTAL STUDY OF URANIUM(6+) SORPTION ON THE ZEOLITE MINERAL CLINOPTILOLITE 777
Roberto T. Pabalan, J.D. Prikryl, P.M. Muller, and T.B. Dietrich

RADIONUCLIDE SORPTION MODELING USING THE MINTEQA2 SPECIATION CODE 783
David R. Turner, T. Griffin, and T.B. Dietrich

MEASUREMENTS OF METAL ADSORPTION IN OXIDE-CLAY MIXTURES: "COMPETITIVE-ADDITIVITY" AMONG MIXTURE COMPONENTS 791
V.S. Tripathi, M.D. Siegel, and Z.S. Kooner

TRANSPORT OF NEPTUNIUM THROUGH YUCCA MOUNTAIN TUFFS 797
I.R. Triay, B.A. Robinson, A.J. Mitchell, C.M. Overly, and R.M. Lopez

RADIONUCLIDE MIGRATION STUDIES ON TONALITE 803
P. Hölttä, M. Siitari-Kauppi, M. Hakanen, and A. Hautojärvi

RADIO-LABELLED HUMIC MATERIALS IN MIGRATION STUDIES 811
Lars Carlsen, Pia Lassen, Peter Warwick, and Amanda Randall

COLLOID PROPERTIES IN GRANITIC GROUNDWATER SYSTEMS, WITH EMPHASIS ON THE IMPACT ON SAFETY ASSESSMENT OF A RADIOACTIVE WASTE REPOSITORY 817
C. Delgueldre

THE INFLUENCE OF NON-LINEAR SORPTION ON COLLOID FACILITATED RADIONUCLIDE TRANSPORT THROUGH FRACTURED MEDIA 825
Paul A. Smith

TRANSPORT MODELING IN A FINITE FRACTURED ROCK DOMAIN 831
Craig F. Novak

DIRECT DETERMINATION OF TRANSPORT PARAMETERS IN REPOSITORY MATERIALS 839
J.L. Conca, M.J. Apted, and R.C. Arthur

DIFFUSIVITY AND POROSITY IN ROCK MATRIX—LABORATORY METHODS USING ARTIFICIAL AND NATURAL TRACERS 845
M. Valkiainen, M. Olin, K. Uusheimo, H. Kumpulainen, J. Lehikoinen, and A. Muurinen

DEVELOPMENT OF A GAS METHOD FOR MIGRATION STUDIES IN FRACTURED AND POROUS MEDIA 851
Kusti Väätäinen, Jussi Timonen, and Aimo Hautojärvi

BNFL LYSIMETER PROGRAMME TO INVESTIGATE THE LEACHING OF RADIONUCLIDES FROM LOW-LEVEL RADIOACTIVE WASTE 857
K. Clayton, R. Clegg, R.G.G. Holmes, and G.W.A. Newton

PILOT AND FIELD-SCALE URANIUM LYSIMETER STUDIES AT THE OAK RIDGE Y-12 PLANT 865
Dianne D. Gates, Chet W. Francis, Lisa M. Laster, and Rod Kimmitt

PART XII: PERFORMANCE ASSESSMENT OF GEOLOGICAL SYSTEMS

*IS IT POSSIBLE TO DEMONSTRATE COMPLIANCE WITH THE REGULATIONS FOR HIGH-LEVEL-WASTE REPOSITORIES? 873
Felton W. Bingham

*CONCEPTUAL STRUCTURE OF PERFORMANCE ASSESSMENTS CONDUCTED FOR THE WASTE ISOLATION PILOT PLANT 885
J.C. Helton, M.G. Marietta, and R.P. Rechard

ITERATIVE PERFORMANCE ASSESSMENT FOR THE GREATER CONFINEMENT DISPOSAL FACILITIES: PRELIMINARY RESULTS OF ROUND TWO 899
Natalie E. Olague, T.A. Baer, and S.H. Conrad

MODEL VALIDATION AND DECISION MAKING: AN EXAMPLE USING THE TWIN LAKES TRACER TEST 909
Natalie E. Olague, Paul A. Davis, Darrla Smith, and Tom Feeney

UNCERTAINTY AND SENSITIVITY ANALYSES OF GROUNDWATER TRAVEL TIME IN A TWO-DIMENSIONAL VARIABLY-SATURATED FRACTURED GEOLOGIC MEDIUM 921
A.B. Gureghian and B. Sagar

EFFECTS OF SOME COMMON GEOLOGICAL FEATURES ON TWO-DIMENSIONAL VARIABLY SATURATED FLOW 929
Amvrossios C. Bagtzoglou, Rachid Ababou, Budhi Sagar, and M. Rashidul Islam

A DEMONSTRATION OF DOSE MODELING AT YUCCA MOUNTAIN 937
Terri B. Miley and Paul W. Eslinger

THE USE OF FORMAL AND INFORMAL EXPERT JUDGMENTS WHEN INTERPRETING DATA FOR PERFORMANCE ASSESSMENTS 943
Rob P. Rechard, Kathleen M. Trauth, Jonathan S. Rath, Robert V. Guzowski, Stephen C. Hora, and Martin S. Tierney

*Invited Paper

*APPROACHES TO LONG-TERM PERFORMANCE ASSESSMENT OF DEEP UNDERGROUND DISPOSAL OF RADIOACTIVE WASTES: A EUROPEAN PERSPECTIVE 951
Trevor J. Sumerling and David Read

AUTHOR INDEX 963

SUBJECT INDEX 967

*Invited Paper

Preface

The Sixteenth International Symposium on the Scientific Basis for Nuclear Waste Management was held in Boston, Massachusetts, from November 30 to December 4, 1992. This proceedings marks the 15th year in which this symposium has been convened (there were two symposia held in 1982). Four have been convened in European cities: Berlin, in 1982 and 1988; Stockholm, in 1985; and Strasbourg, in 1991. The other 12 were held in the United States. Over this period, this symposium has been the principal meeting place for scientists and engineers concerned with the scientific basis for the disposal of nuclear waste. This 16th symposium attracted over 200 registrants, as Symposium V of the 1992 Fall Meeting of the Materials Research Society, which hosted 25 symposia and about 3900 registrants—currently, membership of the MRS in the U.S. is about 11,000, and the MRS of Europe has about 1200 members. At Symposium V, Japan, which is presently slated to host the 1994 symposium on nuclear waste, was very well represented with publications and manuscripts. The 1993 meeting will again be in Boston, where it will be Co-Chaired by Dr. Aaron Barkatt, Catholic University of America, Washington, DC, and Dr. Rich Van Konynenburg, Lawrence Livermore National Laboratory, Livermore, CA. The international character of the symposium on nuclear waste is perennial. Forty percent of the manuscripts submitted for Symposium V were written by authors from countries outside the U.S. For an even greater percentage, English is not the author's first language. In recognition of these facts, during the review process, substantial efforts were devoted to clarification of English in the manuscripts.

One most significant aspect of this particular symposium is the focus on the scientific basis for management of nuclear waste. Engineering principles and practices are important, but this symposium focuses on the science. The extension and application of engineering "know how" to waste management problems sometimes requires a degree of understanding not normally needed to solve other engineering problems. In materials science, for example, scientific understandings important to long-term behavior may be obtained from (1) characterizations and analyses of the structure and properties of materials, (2) the recognition of advancements needed to ensure performance, and (3) improvements in methods of fabrication and processing. In addition to the materials science topics addressed here (on waste forms, engineered barrier systems, and the near-field environment), the symposium addressed various far-field topics, as listed below.

The background and experiences of the two Symposium Co-Chairmen differ significantly. This provided leadership, in each of two rather diverse fields, so that our work with Session Co-Chairs could be divided, more or less, into the two classifications, engineered barriers and geologic barriers. Accordingly, primary responsibility for each of the technical sessions was divided as follows: Dr. Interrante worked mainly on the engineered-barrier topics: Cementitious Materials, Container Alteration, Glass Leaching Mechanisms, Glass and Crystalline Waste Forms, Long-Term Prediction, Microbially Influenced Corrosion, Performance Assessment of Engineered Barrier Systems, and Spent Fuel. Dr. Pabalan worked mainly on the geologic-barrier topics: Natural Analogues, Performance Assessment of Geological Systems, and Radionuclide Chemistry and Transport; he also dealt with Near-Field Interactions. A call for papers was prepared by the Symposium Co-Chairmen. It attracted 172 abstracts, including those from invited speakers. Forty nine of these were withdrawn or rejected, either as abstracts or manuscripts. The balance of 123 represents those published as the Proceedings of Symposium XVI on the Scientific Basis for Nuclear Waste Management.

This proceedings is the product of the efforts of a great number of people, without whose help this useful publication would not exist. Not the least of these are the courteous, competent members of the staff of the Materials Research Society. Subject specialists were of enormous value. In addition to their roles as Session Co-Chairs at the Symposium, some served on the Organizing Committee, which governed the

acceptance of contributed abstracts, and many served as Referees. Many have assisted by thoughtfully crafting their technical session with imaginative use of invitations to speakers, whether to delineate the latest research progress in a given field, or to introduce a topic or cover one in a broad sense, or to round out a set of contributed papers. Three Editorial Assistants worked with authors and manuscripts to clarify the English, reduce ambiguity, and unify the form and style, with a broad objective of compiling a proceedings that is easy to read and understand. Technical review and editing was accomplished by a host of subject specialists chosen by the Referees. Each manuscript was reviewed technically, usually by three Reviewers, with a Session Co-Chair serving as Referee between author and Reviewer, and with the Symposium Co-Chairmen serving as final arbiter, when necessary. Finally, Prof. Dr. J.I. Kim, our Keynote Lecturer, was most accommodating in delivering his outstanding lecture and camera-ready paper. These workers and the many authors, who themselves have been most cooperative and compliant with our deadlines and requests for rewrites, are the spring from which the works presented here have been drawn. To each of these contributors we extend our warmest appreciation and thanks.

C.G. Interrante
R.T. Pabalan

February 1993

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Ms. Katherine Andrews, Editorial Assistant, Harvard University, Cambridge, MA
Mrs. Ellen Kraus, Editorial Assistant, Washington, D.C.
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Ms. Michelle Nicolay, Logistical Support, Complete Conference, Sacramento, CA
Mr. Kevin J. Cumminskey, ProJection Video Svcs., Inc., Boston MA

The following alphabetical listing of the technical sessions, from which the Chapters of this proceedings were derived, gives the principal Referee for each session (in bold) and the other Co-Chair(s), some of whom served also as Referee. Members of the Symposium Organizing Committee are designated with an asterisk.

Cementitious Materials

Mr. Robert E. Shewmaker *
U.S. Nuclear Regulatory Commission
Washington, DC

Dr. Asher N. Sembira
NRCN
Beer-Sheva, Israel

Container Alteration

Prof. David J. Duquette
Rensselaer Polytechnic Institute
Troy, NY

Dr. Johannis Noggerath
Swiss Federal Nuclear Safety Inspectorate
Villigen-HSK, Switzerland

Glass Leaching Mechanisms

Dr. John K. Bates *
Argonne National Laboratory
Argonne, IL

Dr. Werner Lutze
Kernforschungszentrum
Karlsruhe, Germany

Glass and Crystalline Waste Forms

Prof. Rodney C. Ewing *
University of New Mexico
Albuquerque, NM

Mr. Claude G. Sombret
Commissariat a l'Energie Atomique
Marcoule, France

Long-Term Prediction

Dr. Tae M. Ahn *
U.S. Nuclear Regulatory Commission
Washington, DC

Dr. Prasad K. Nair *
CNWRA, Southwest Research Institute
San Antonio, TX

Microbially Influenced Corrosion

Dr. Michael B. McNeil *
U.S. Nuclear Regulatory Commission
Washington, DC

Dr. Nicholas J.E. Dowling
IRSID
Firminy, France

Natural Analogues

Dr. William M. Murphy *
CNWRA, Southwest Research Institute
San Antonio, TX

Near-Field Interactions

Prof. Teofilo A. Abrajano, Jr. *
Memorial University of Newfoundland
Newfoundland, Canada

Performance Assessment of Engineered Systems

Mr. Alan I. Berusch *
U.S. Department of Energy
Washington, DC

Prof. Ivars Neretnieks
Royal Institute of Technology
Stockholm, Sweden

Performance Assessment of Geologic Systems

Dr. Malcolm D. Siegel *
Sandia National Laboratories
Albuquerque, NM.

Dr. David Read
W.S. Atkins Science and Technology
Surrey, Epsom, U.K.

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Mrs. Schon S. Levy
Los Alamos National Laboratory
Los Alamos, NM

with T. Ahn, J. Bates, M. McNeil, A. Sembira, M. Siegel, C. Sombret, I. Triay

Spent Fuel

Dr. Lars O. Werme
SKB
Stockholm, Sweden

Transport I & II

Dr. Ines R. Triay *
Los Alamos National Laboratory
Los Alamos, NM

Dr. Larry E. Hersman
Los Alamos National Laboratory
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Prof. Teofilo A. Abrajano, Jr.

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