



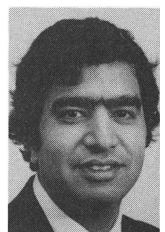
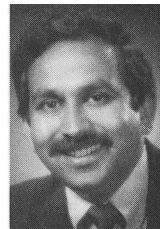
AUTHORS — JANUARY 1987

FISSION REACTORS

CONSIDERATIONS FOR REALISTIC EMERGENCY CORE COOLING SYSTEM EVALUATION METHODOLOGY FOR LIGHT WATER REACTORS

U. S. Rohatgi (top) (BS, mechanical engineering, Indian Institute of Technology, Kanpur, India, 1970; MS, 1972, and PhD, 1975, fluids and thermal sciences, Case Western Reserve University) has been a mechanical engineer in the Department of Nuclear Energy at Brookhaven National Laboratory (BNL) since 1975. His main areas of interest are two-phase flow in nuclear reactors, turbomachinery, and combustion. Currently he is involved in assessing various advanced thermohydraulic codes for the Nuclear Regulatory Commission, safety calculations for the Electric Power Research Institute (EPRI), and combustion research for the U.S. Air Force. **Pradip Saha** (center) (BE, mechanical engineering, Calcutta University, India, 1968; MS, 1971, and PhD, 1974, mechanical engineering, Georgia Institute of Technology) worked for General Electric Company and BNL in the areas of two-phase flow modeling and nuclear reactor safety code assessment and application. He is now the chairman and managing director of Flotherm Consultants Private, Ltd., Calcutta, India, providing specialized consulting services to the energy, process, and chemical industries. **V. K. (Bindi) Chexal** (bottom) (BS, mechanical engineering, Thapar Institute of Technology, India, 1970; MS, mechanical engineering, Georgia Institute of Technology, 1972) is a subprogram manager in the Nuclear Safety Analysis Center, Nuclear Power Division of EPRI. Currently, he has two matrix management assignments, emergency core cooling systems and piping integrity. From 1975 to 1977, he worked for Atomic Energy of Canada, Ltd., and before joining EPRI, he spent five years with Quadrex Corporation.

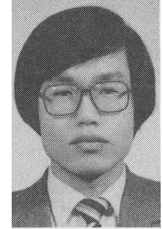
*U. S. Rohatgi
Pradip Saha
V. K. Chexal*



AN ON-LINE PRESSURIZER SURVEILLANCE SYSTEM DESIGN TO PREVENT SMALL-BREAK LOSS-OF-COOLANT ACCIDENTS THROUGH POWER-OPERATED RELIEF VALVES USING A MICROCOMPUTER

Jong Ho Lee (top) [BS, nuclear engineering, Seoul National University, 1984; MS, nuclear engineering, Korea Advanced Institute of Science and Technology (KAIST), 1986] is a nuclear engineer in charge of the technical support for Korea Nuclear Units 5 and 6. His current research interests are computer-aided operation and probabilistic risk assessment. **Soon Heung Chang** (PhD, Massachusetts Institute of Technology, 1981) is an associate professor of nuclear engineering at KAIST. He has worked on computational methods and modeling of thermal hydraulics and probabilistic safety analysis and computer-aided operation. His current research interests lie in the development of advanced numerical methods and symbolic computational methods applied to various nuclear engineering areas.

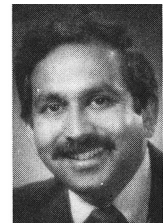
*Jong Ho Lee
Soon Heung Chang*



DETERMINATION OF APPENDIX K CONSERVATISMS FOR WESTINGHOUSE PRESSURIZED WATER REACTORS USING TRAC-PD2/MOD1

U. S. Rohatgi (top) (BS, mechanical engineering, Indian Institute of Technology, Kanpur, India, 1970; MS, 1972, and PhD, 1975, fluids and thermal sciences, Case Western Reserve University) has been a mechanical engineer in the Department of Nuclear Energy at Brookhaven National Laboratory (BNL) since 1975. His main areas of interest are two-phase flow in nuclear reactors, turbomachinery, and combustion. Currently he is involved in assessing various advanced thermohydraulic codes for the Nuclear Regulatory Commission, safety calculations for the Electric Power Research Institute, and combustion research for the U.S. Air Force. **Christine Yuelys-Miksis** (photo not available) (BS, mechanical engineering, State University of New York at Stony Brook, 1976) was a staff engineer in the Department of Nuclear Energy at BNL. While at BNL, she worked on the evaluation of thermal-hydraulic models in advanced systems codes. She is currently at the National Energy Software Center at Argonne National Laboratory. **Pradip Saha** (bottom) (BE, mechanical engineering, Calcutta University, India, 1968; MS, 1971, and PhD, 1974, mechanical engineering, Georgia Institute of Technology) worked for General Electric Company and BNL in the areas of two-phase flow modeling, nuclear reactor safety code assessment, and application. He is now the chairman and managing director of Flotherm Consultants Private Ltd., Calcutta, India, and is providing specialized consulting services to the energy, process, and chemical industries.

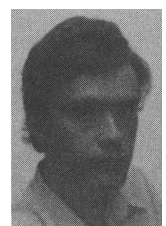
*U. S. Rohatgi
Christine Yuelys-Miksis
Pradip Saha*



X-RAY PHOTOELECTRON SPECTROSCOPY AND ELECTRON PROBE X-RAY MICROANALYSIS INVESTIGATION AND CHEMICAL SPECIATION OF AEROSOL SAMPLES FORMED IN LIGHT WATER REACTOR CORE-MELTING EXPERIMENTS

Harald Moers (right) [PhD, chemistry, University of Karlsruhe, Federal Republic of Germany (FRG), 1986] has been a member of the surface analytical group of the Institute of Radiochemistry

*Harald Moers
Hanns Klewe-Nebenius
Hans J. Ache*



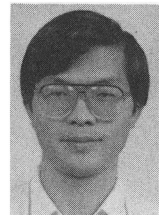
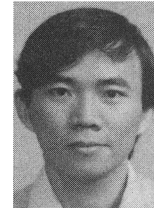
at Karlsruhe Nuclear Research Center (KfK) since 1982. His present field of activity is the application of surface and micro-analytical methods to fabrication and testing of microstructures. **Hanns Klewe-Nebenius** (top) (PhD, nuclear physics, University of Heidelberg, FRG, 1973) joined the Institute of Radiochemistry at KfK in 1976. Since 1981 he has been in charge of the surface analytical group in the instrumental analytics department of the institute. **Hans J. Ache** (bottom) (PhD, University of Cologne, FRG, 1959) was an associate scientist from 1962 to 1965 at Brookhaven National Laboratory, professor of chemistry at Virginia Polytechnic Institute and State University, Blacksburg, Virginia, from 1965 to 1980, and since 1981 he has been a chaired professor at the University of Karlsruhe and director of the Institute of Radiochemistry at KfK.



THE APPLICATIONS OF NUCLEAR TECHNOLOGY IN REACTOR SITING

Pao-Shan Weng (top right) (PhD, nuclear engineering, Texas A&M University, 1966) has been a professor at National Tsing Hua University (NTHU), Taiwan, since 1970. His primary research interests are in health physics and nuclear applications. **Hseuh-Hsing Cheng** (top left) (BE, nuclear engineering, 1979, and MS, health physics, 1981, NTHU, Taiwan) is a PhD candidate at the Graduate Institute of Nuclear Engineering, NTHU. He is expected to finish his doctoral program in March 1987. His primary interests include health physics and nuclear applications. **Chuan-Chung Hsu** (bottom right) (BE, nuclear engineering, NTHU, Taiwan, 1983) has been a research assistant at the Graduate Institute of Nuclear Science, NTHU, since 1985. His primary research interest is in environmental monitoring. **Kuan-Han Sun** (bottom left) (PhD, physics, University of Pittsburgh, 1940) was the head of, and is now the consultant to, the Radiation and Neutronics Laboratory, Westinghouse Research Laboratories. He is also the consultant to the Graduate Institute of Nuclear Science, NTHU. He has published over 150 scientific papers and also holds over 40 U.S. patents, mostly in the fields of nuclear science and technology and glass science.

*Pao-Shan Weng
Hseuh-Hsing Cheng
Chuan-Chung Hsu
Kuan-Han Sun*



FUEL CYCLES

IN-CORE FUEL CYCLE TRANSIENTS

Jeffery David Lewins (BA and MA, mechanical engineering, University of Cambridge, 1956; MSc and PhD, nuclear engineering, Massachusetts Institute of Technology, 1959; PhD, engineering, Cambridge; DSc, engineering, University of London, 1979) was with the British Army's Royal Engineers until he joined the University of London in 1969. Since 1980 he has been at the University of Cambridge, where he is responsible for nuclear engineering in the Department of Engineering. His primary interests are in perturbation theory and dynamics. His study of fuel cycle dynamics arose from a sabbatical at the University of Washington, where he worked closely with Maurice Egan on the analysis of in-core fuel cycle transients.

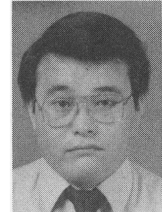
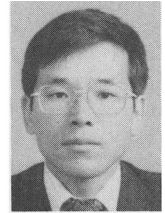
Jeffery David Lewins



**THE LEACHING BEHAVIOR OF A GLASS WASTE FORM –
PART III: THE MATHEMATICAL LEACHING MODEL**

Tsunetaka Banba (top) (BS, 1972, and MS, 1974, chemical engineering, Nagoya University, Japan) has been a research scientist for the Japan Atomic Energy Research Institute (JAERI) since 1974. His work has involved many aspects in the field of waste management. His main interest is in developing an understanding of glass interactions with aqueous solutions. **Takashi Murakami** (center) (BS, 1975; MS, 1977; and DSc, 1980, crystallography and mineralogy, University of Tokyo, Japan) has been working for JAERI and the University of New Mexico. His interests are in the microstructures and leaching mechanisms of glass and ceramic waste forms and also in the radiation effects on materials. **Hideo Kimura** (bottom) (MS, physics, Osaka City University, 1979) is on the research staff at JAERI. He has been working on problems concerning radionuclide transport from nuclear waste repositories and groundwater hydrology.

*Tsunetaka Banba
Takashi Murakami
Hideo Kimura*

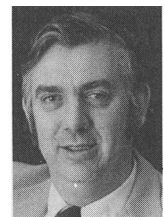


FOURTH INTERNATIONAL RETRAN MEETING

RETRAN OVERVIEW

Lance J. Agee (MS, nuclear engineering, University of Nevada, Reno, 1966) has been associated with developing large-computer codes since 1967. He has been the Electric Power Research Institute (EPRI) project manager responsible for RETRAN code development since its inception in 1975 and is currently responsible for the Analytical Methods and Verification Subprogram at EPRI.

Lance J. Agee



RETRAN GENERIC REVIEW – A RETROSPECTION

Thomas L. Temple (BS, nuclear engineering, Lowell Technological Institute, 1971) is currently manager of plant systems analysis at Middle South Services, Inc. Since mid-1981, he has been the *de facto* secretary for the utility group sponsoring the RETRAN review.

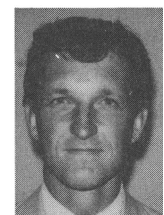
Thomas L. Temple



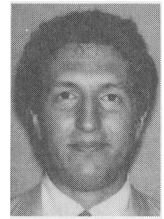
THE DEVELOPMENT AND APPLICATION OF SYSTEM ANALYSIS AT KANSAS GAS AND ELECTRIC COMPANY

Terry J. Garrett (right) (BS, nuclear engineering, Kansas State University, 1978; MS, mechanical engineering, Carnegie-Mellon University, 1981) is the lead engineer of the Safety Analysis Section at Kansas Gas and Electric Company. He has also worked as a core thermal-hydraulics engineer for the light water breeder reactor project at Bettis Atomic Power Laboratory. His current

*Terry J. Garrett
Steven W. Sorrell*



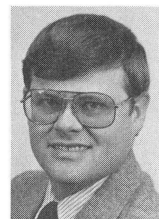
interests are in accident analysis, reload design safety analysis, and setpoint uncertainty analysis. **Steven W. Sorrell** (right) (BS, nuclear engineering, Iowa State University, 1983) is an engineer in the Safety Analysis Section of Kansas Gas and Electric Company. His job responsibilities include performing safety analyses pursuant to the operation of Wolf Creek Generating Station. His interests include accident analysis, reactor engineering, and thermal hydraulics.



REDUCING SCRAM FREQUENCY BY MODIFYING REACTOR SETPOINTS FOR A WESTINGHOUSE FOUR-LOOP PLANT

Jason Chao (top) [MA, physics, University of Texas at Austin, 1974; PhD, nuclear engineering, Massachusetts Institute of Technology (MIT), 1979] is presently a project manager at the Electric Power Research Institute (EPRI). He has participated in plant analyses related to pressurized thermal shock, steam generator tube rupture, anticipated transients without scram, and scram reduction issues at EPRI. His past experience includes design studies of reduced enrichment fuel for research reactors at Science Applications, Inc., for Argonne National Laboratory, a design study of tokamak fusion reactor blanket at MIT, and experimental investigations on nuclear structure of krypton isotopes with a Van de Graaff Accelerator at the University of Texas at Austin. He is a registered professional engineer in mechanical engineering in the state of California. **William H. Layman** (center), who is currently manager of generic safety analysis at EPRI, has been involved in nuclear power since 1952. He was formerly assistant director of the Atomic Energy Commission's Division of Reactor Safety Research, and before that he was chief of the Water Reactors Branch of the Division of Reactor Development and Technology. His work in the nuclear field began with nine years of service in the U.S. Navy's nuclear submarine program. **Gary Vine** (bottom) (BS, physics and applied mathematics, U.S. Naval Academy; MS, physics, U.S. Naval Postgraduate School) is a project manager at EPRI. He conducts safety analyses of commercial nuclear power plants with emphasis on operating experience and generic safety issues. He joined the institute in 1981. Before joining EPRI, he spent 11 years with the U.S. Navy in the nuclear submarine program.

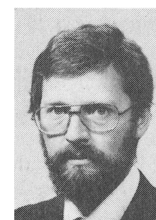
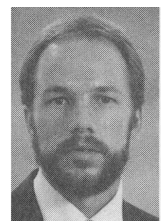
*Jason Chao
William H. Layman
Gary Vine*



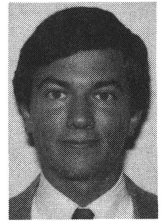
NODALIZATION STUDY OF THE WESTINGHOUSE MODEL E STEAM GENERATOR SECONDARY SIDE

Robert O. Montgomery (top) [MS, Texas A&M University (TAMU), 1986] is a graduate research associate in the nuclear engineering department at TAMU. Since becoming a staff member in 1983, he has worked in the areas of fast and thermal reactor fuel performance computer modeling, subchannel thermal hydraulics, and characterization of advanced reactor fuels. He is currently working on his PhD at TAMU. **Kenneth L. Peddicord** (bottom) (PhD, University of Illinois, 1972) is a professor in the Department of Nuclear Engineering at TAMU. His interests include thermal and fast reactor fuel performance, advanced fuels for fast reactors, thermal hydraulics, and advanced reactor systems design. Currently he is the department head of the nuclear engineering department at TAMU. He served as a research nuclear engineer at the Swiss Federal Institute for Reactor Research, Würenlingen, Switzerland, from 1972 to 1975,

*Robert O. Montgomery
Kenneth L. Peddicord
Roger L. Boyer
Charles R. Albury*



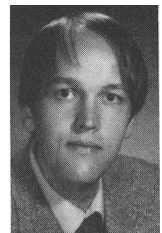
and as a faculty member in nuclear engineering at Oregon State University from 1975 to 1982. He has been on the faculty at TAMU since 1983. **Roger L. Boyer** (top) (BS, nuclear engineering, 1981; BS, mechanical engineering, 1981; MS, nuclear engineering, 1983, University of Missouri-Rolla) is an engineer at Houston Lighting & Power (HL&P) in the nuclear engineering department. He has spent the last four years in thermal-hydraulic system analysis with both HL&P and Union Electric. Currently he is performing a risk-based evaluation of technical specifications as part of a joint Electric Power Research Institute/HL&P project. **Charles R. Albury** (bottom) (MS, nuclear engineering, University of Florida, 1978) worked for the Bettis Atomic Power Laboratory prior to joining HL&P in 1981. His current responsibilities include the thermal-hydraulic analysis and engineering computer support sections for the South Texas Nuclear Project.



RETRAN MODELING OF THE WESTINGHOUSE MODEL D STEAM GENERATOR

Lance G. Riniker (top) (SB and SM, nuclear engineering, Massachusetts Institute of Technology, 1985) is an engineer at the Commonwealth Edison Company (CEC) Dresden nuclear power station. He has worked with RETRAN modeling of the Byron and Braidwood nuclear stations while at CEC's nuclear fuel services department. He is currently working in the field of core management. **Kevin B. Ramsden** (BS, mechanical engineering, Illinois Institute of Technology, 1974) is a senior engineer at CEC. He has served as project engineer for the Mark I Containment Program and has done assignments in training and operations at the Dresden station. He has been a technical group leader in the Reactor Safety Analysis Group within the nuclear fuel services department since 1981, with primary responsibility for the development of transient analysis capability of CEC plants.

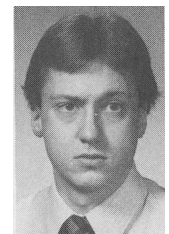
*Lance G. Riniker
Kevin B. Ramsden*



RETRAN ANALYSIS OF SUSQUEHANNA STEAM ELECTRIC STATION UNIT 2 MOISTURE SEPARATOR DRAIN TANK LEVEL TRANSIENT RESPONSE

Laurence M. Olson (BS, nuclear engineering, Pennsylvania State University, 1981) is currently a project engineer in the nuclear licensing department at Pennsylvania Power & Light Company (PP&L). He has four years of experience in PP&L's Engineering Analysis Group, involved in transient and thermal-hydraulic analysis.

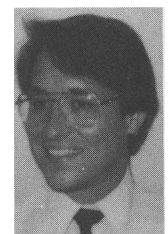
Laurence M. Olson



A COMPARISON OF RETRAN-02 AND TRAC-PF1 SIMULATIONS OF A LOSS OF OFF-SITE POWER COOLDOWN TO RESIDUAL HEAT REMOVAL ENTRY CONDITIONS AT CALVERT CLIFFS NUCLEAR POWER PLANT

Trevor L. Cook (right) (BS, nuclear engineering, University of Tennessee, 1982) was a co-op at the Savannah River Laboratory in the Environmental Transport and Reactor Physics Divisions where he worked in code development and applications for aquatic transport models and core reactivity effects. Since joining Baltimore Gas and Electric (BG&E), he has worked in the areas

*Trevor L. Cook
Steven M. Mirsky*



of thermal hydraulics, shielding, criticality, and dose assessment. **Steven M. Mirsky** (right) (MS, nuclear engineering, Pennsylvania State University, 1976; BE, mechanical engineering, Cooper Union, 1974) is the supervisor of the Analytical Support Unit of the BG&E. He has worked in the areas of nuclear power plant thermal hydraulics, shielding, dose assessment, and fuel performance safety analyses for the past 11 years. Before joining BG&E, he was manager of the safety analysis department at the NUS Corporation, and was an engineer with the Virginia Electric and Power Corporation. He has been involved with RETRAN model development and thermal-hydraulic analyses since 1977.



SAFETY ANALYSES USING RETRAN-02 WITH RELAXED TRIP SETPOINTS ON COMBUSTION ENGINEERING REACTORS

Bruce Ching (top right) [BNE, nuclear engineering, Georgia Institute of Technology, 1982; MS, nuclear engineering, Massachusetts Institute of Technology (MIT), 1983] is a senior nuclear engineer at Combustion Engineering (C-E). He has been involved in safety analysis, secondary side performance improvement, start-up analysis, and various company research and development programs. **Chong Chiu** (top left) (BS, Tsinghua University, Taiwan, 1974; MS, MIT, 1976; PhD, MIT, 1977) is assistant manager for the Technical Division at Southern California Edison Company. His current professional scope includes operations support, failure analysis of plant problems, and performance improvements of the San Onofre Nuclear Generation Station Units 1, 2, and 3. Previously, he was with C-E for eight years, where he held various engineering and management positions. He has extensive experience in the development of C-E's digital protection and monitoring systems and plant performance improvements, via innovative modifications and heat rate problem diagnosis. **Jason Chao** (center right) (MA, physics, University of Texas at Austin, 1974; PhD, nuclear engineering, MIT, 1979) is presently a project manager at the Electric Power Research Institute (EPRI). He has participated in plant analyses related to pressurized thermal shock, steam generator tube rupture, anticipated transients without scram, and scram reduction issues at EPRI. His past experience includes design studies of reduced enrichment fuel for research reactors at Science Applications, Inc., for Argonne National Laboratory, a design study of tokamak fusion reactor blanket at MIT, and experimental investigations on nuclear structure of krypton isotopes with a Van de Graaff Accelerator at the University of Texas at Austin. He is a registered professional engineer in mechanical engineering in the state of California. **William H. Layman** (bottom left), who is currently manager of generic safety analysis at EPRI, has been involved in nuclear power since 1952. He was formerly assistant director of the Atomic Energy Commission's Division of Reactor Safety Research, and before that he was chief of the Water Reactors Branch of the Division of Reactor Development and Technology. His work in the nuclear field began with nine years of service in the U.S. Navy's nuclear submarine program. **Gary Vine** (bottom right) (BS, physics and applied mathematics, U.S. Naval Academy; MS, physics, U.S. Naval Postgraduate School) is a project manager at EPRI. He conducts safety analyses of commercial nuclear power plants with emphasis on operating experience and generic safety issues. He joined the Institute in 1981. Before joining EPRI, he spent 11 years with the U.S. Navy in the nuclear submarine program.

*Bruce Ching
Chong Chiu
Jason Chao
William H. Layman
Gary Vine*



PASSIVE EMERGENCY COOLING SYSTEMS FOR BOILING WATER REACTORS (PECOS-BWR)*Charles W. Forsberg*

Charles W. Forsberg [BSc, chemical engineering, University of Minnesota, 1969; MS, nuclear engineering, Massachusetts Institute of Technology (MIT), 1972; ScD, nuclear engineering, MIT, 1974] has worked at Oak Ridge National Laboratory on a variety of fuel cycle waste and reactor problems. His current interests include fluidics and passive safety systems for power reactors and hazardous waste management (chemical and radioactive).

