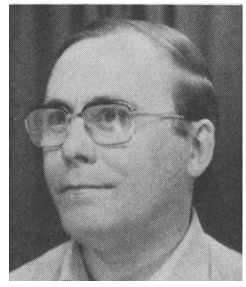
nuclear technology®

AUTHORS — MARCH 1982

FISSION REACTORS

ON THE BEHAVIOR OF IMPREGNATED CHARCOAL FILTERS DURING A TWO-STAGE ACCIDENT

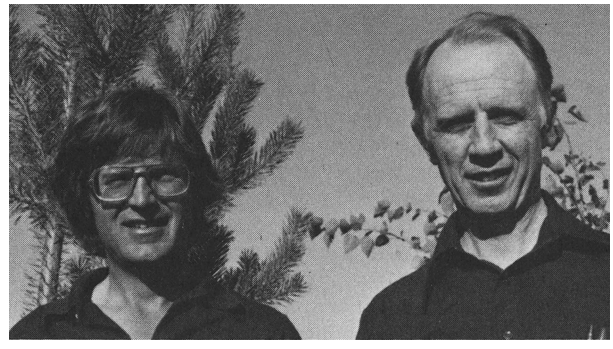
L. Böhm



Lothar Böhm (PhD, physics, University of Göttingen, 1969), an employee of Karlsruhe Nuclear Research Centre from 1972 to 1975, and a licensing authority in Essen, Germany from 1976 to 1980, is now an employee of HRB (high temperature reactor builders), in Weinheim, Germany. His interests include filtering and shielding in reactor plants.

TRANSITION BOILING HEAT TRANSFER IN THE SEMI-SCALE MOD-3 CORE DURING REFLOOD

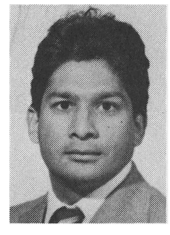
G. G. Loomis
R. W. Shumway

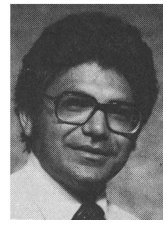


Guy G. Loomis (left) (BS, engineering physics, Texas Tech University, 1970; MS, nuclear engineering, University of New Mexico, 1972) is a senior engineer with the Water Reactor Research Test Facility at the Idaho National Engineering Laboratory (INEL). Present research involves natural circulation in light water reactors, reflood heat transfer, and two-phase pump performance. **R. W. Shumway** (right) (BES, 1965, and MS, 1966, mechanical engineering, Brigham Young University; PhD, mechanical engineering, University of Arizona, 1969) is an engineering specialist with the Code Development Division at INEL. Present studies are boiling water reactor heat transfer.

GAP CONDUCTANCE AND TEMPERATURE TRANSIENTS IN MODIFIED PULSE DESIGN EXPERIMENTS

V. K. Chandola
S. K. Loyalka

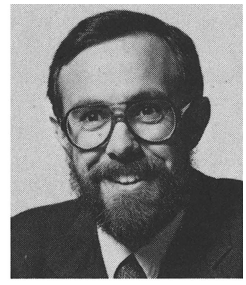




V. K. Chandola (top) (BS, physics, Baneras Hindu University, India, 1974; MS, physics, University of Illinois-Urbana, 1976; PhD, nuclear engineering, University of Missouri-Columbia, 1980) is interested in reactor thermal hydraulics and reactor simulation research and is currently employed with Link-Singer in Silver Spring, Maryland. **S. K. Loyalka** [BS, mechanical engineering (honors), University of Rajasthan, India, 1964; MS, 1965, and PhD, nuclear engineering, Stanford University, 1967] is professor of nuclear engineering and a James C. Dowell professor of engineering at the University of Missouri-Columbia. His research interests are in kinetic theory of gases, transport theory, reactor physics, and thermal hydraulics and aerosol mechanics.

POWER ESTIMATION IN THE PRESSURIZED WATER REACTOR

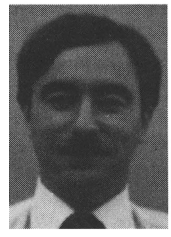
James M. Griffith



James M. Griffith (PhD, electrical engineering, University of Idaho, 1978) is an engineering specialist with the Idaho National Engineering Laboratory. He has 12 years of experience with measurement system design, signal processing, estimation, and modeling. His technical interests are currently in the estimation and identification areas.

SYNTHETIC FUEL PRODUCTION USING TEXAS LIGNITE AND A VERY HIGH TEMPERATURE REACTOR FOR PROCESS HEAT

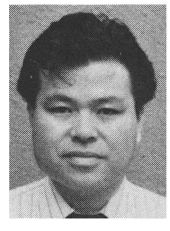
Michael A. Ross
Dale E. Klein

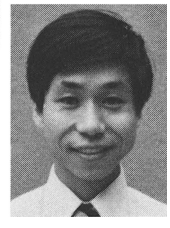


Michael A. Ross (top) (MS, mechanical engineering, The University of Texas at Austin, 1980) is currently a manufacturing engineer specialist for the Westinghouse Electric Corporation. He has worked for Westinghouse since 1973 and is a registered professional engineer in the state of Texas. **Dale E. Klein** (PhD, nuclear engineering, University of Missouri-Columbia, 1977) is an assistant professor of mechanical engineering and assistant director, Nuclear Studies Division, Center for Energy Studies, at The University of Texas at Austin. His research interests include thermal hydraulics, enhanced heat transfer, and gas-cooled reactor technology.

LOAD FOLLOW SIMULATION OF THREE-DIMENSIONAL BOILING WATER REACTOR CORE BY PACS-32 PARALLEL MICROPROCESSOR SYSTEM

Tsutomu Hoshino
Tomonori Shirakawa



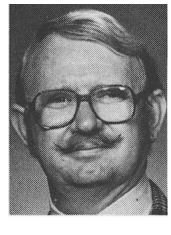


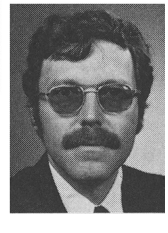
Tsutomu Hoshino (top) (Dr. Eng., electrical engineering, Kyoto University, 1968) is professor of structural engineering (information science) at the University of Tsukuba. He has performed research on dynamics, control, and optimization problems in the nuclear power system. His current interest is the development of a special purpose very high-speed computer for numerical simulation and its application to nuclear engineering. **Tomonori Shirakawa** (Dr. Eng., control engineering, Osaka University, 1977) is a lecturer in structural engineering (information science) at the University of Tsukuba. He has engaged in research on control systems, man-machine systems, and microprocessor applications. His current interest is in multimicroprocessor system applications.

NUCLEAR SAFETY

MONITORING KRYPTON-85 DURING THREE MILE ISLAND UNIT 2 PURGING

William A. Jester
Anthony J. Baratta, Jr.



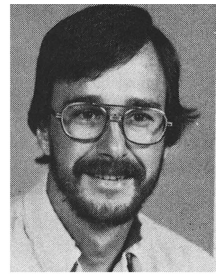


William A. Jester (top) (PhD, chemical engineering, The Pennsylvania State University, 1965) is an associate professor of nuclear engineering at The Pennsylvania State University. His research and teaching interests cover a wide range of applications of ionizing radiation and radioactive materials. His major efforts have been in the development of techniques utilizing nonradioactive, but neutron activatable, tracers and the development of radiation monitoring concepts. **Anthony J. Baratta, Jr.** (PhD, physics, Brown University, 1978) is an assistant

professor of nuclear engineering at The Pennsylvania State University. His research has been in the areas of radiation effects, detection, and measurement.

A GENERALIZED LIKELIHOOD RATIO APPROACH TO DETECTING AND IDENTIFYING FAILURES IN PRESSURIZER INSTRUMENTATION

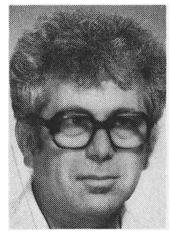
J. Louis Tylee

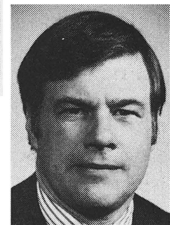


J. Louis Tylee (BS, 1972, and MS, 1974, mechanical engineering, University of California, Davis) is currently completing doctoral studies in electrical engineering at the University of Idaho. Since 1977, he has been a senior engineer with EG&G Idaho, Inc., where for the past three years he has been investigating the potential applications of modern control and estimation theories to the protection and control of nuclear power plants. Prior to joining EG&G, he was an engineer for the General Electric Company Nuclear Energy Division. His current research interests are the development of accurate, low-order process models, failure detection methods, and state estimation.

THE DSNP SIMULATION LANGUAGE AND ITS APPLICATION TO LIQUID-METAL FAST BREEDER REACTOR TRANSIENT ANALYSES

D. Saphier
J. T. Madell



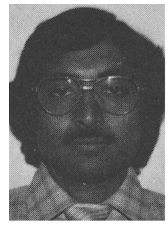


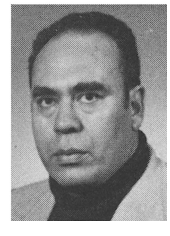
D. Saphier (top) (DSc, reactor physics, Technion–Israel Institute of Technology, 1970) developed the DSNP simulation language between 1975 and 1977 while a visiting scientist at Argonne National Laboratory (ANL). He has been involved in nuclear power plant simulation since 1965 and presently at the Soreq Nuclear Research Centre developing mathematical models for power plant component and using DSNP to simulate pressurized water, liquid-metal fast breeder, and high temperature gas-cooled reactors. **John T. Madell** (ScD, nuclear engineering, Massachusetts Institute of Technology, 1962) is a nuclear engineer in the Components Technology Division at ANL. He has been responsible for various aspects of core design technology at ANL, Interatom (Germany), and Project Management Corporation. His primary interests lie in thermal and mechanical analysis of various types of reactor cores.

FUEL CYCLES

RISK ASSESSMENT OF ALTERNATIVE PROLIFERATION ROUTES

Shahid Ahmed
A. A. Husseiny



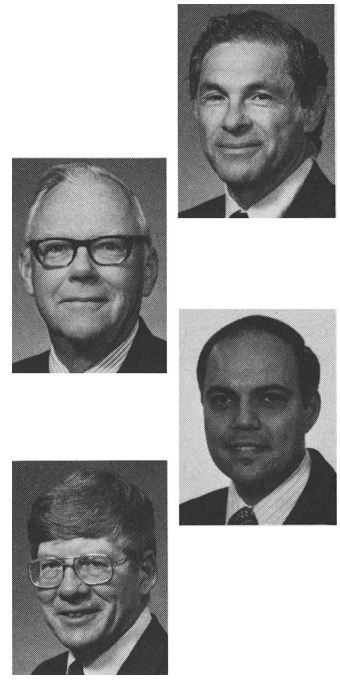


Shahid Ahmed (top) (BS, electrical engineering, University of Karachi, 1974; MS, nuclear engineering, Iowa State University, 1978) has worked as a lecturer at NED Engineering College, Karachi, and Dar-es-Salaam Technical College, Dar-es-Salaam. Currently enrolled in the PhD program at Iowa State University, he is actively involved in risk assessment, availability improvement, and decision analysis of large technological systems in general and nuclear power generation in particular. **Abdo A. Husseiny** (PhD, nuclear engineering, University of Wisconsin, 1969) is manager of the Decision Analysis Division and executive vice-president of Technology International, Inc. He has

been involved in studies on the proliferation of nuclear materials and sabotage for over 16 years and has contributed to the applications of decision theory. His research interests include human factors and risk assessment.

AN EVALUATION OF PRESSURIZED WATER REACTOR FREQUENT REFUELING

I. Bernstein
J. S. Greacen
R. A. Matzie
D. D. Miller

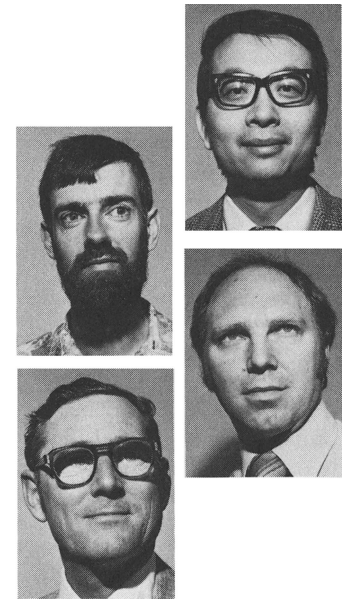


Irving Bernstein (top right) (BS, mechanical engineering, University of Connecticut, 1944), a senior consulting engineer with Combustion Engineering, Inc. (C-E), is a registered professional engineer in Connecticut. He has been involved in the development of systems and equipment for reactor fuel handling and storage since 1956. **John S. Greacen** (top left) (BE, mechanical engineering, Yale University, 1944) is a registered professional engineer in the state of New York and has been involved in reactor fuel handling systems for C-E since 1965. His current interests include the design of remote tooling for reactor servicing, fuel handling, and equipment to reduce plant outage time. **Regis A. Matzie** (bottom right) (BS, physics, U.S. Naval Academy, 1965; MS, 1971, and PhD, 1976, nuclear engineering, Stanford University) is currently the supervisor of Advanced Design Projects at C-E. His current technical interests include the thorium fuel cycle, methods of improving uranium utilization in current design light water reactors, advanced converter reactors, and plutonium recycle. **Dean Miller** (bottom left) (BS, civil engineering, University of Kansas) is a registered professional engineer in Connecticut. He is currently a senior consultant and program manager with C-E's Power Systems Group. His major interest is in nuclear plant outage reduction and its effect on efficiency in generating electricity.

CHEMICAL PROCESSING

OXIDATION OF Pu(III) BY NITRIC ACID IN TRI-*n*-BUTYL PHOSPHATE SOLUTIONS. PART I. KINETICS OF THE REACTION AND ITS EFFECT ON PLUTONIUM LOSSES IN COUNTERCURRENT LIQUID-LIQUID EXTRACTION

Yu-Keung Sze
Leonard James Clegg
Andrew Francis Gerwing
George Robert Grant



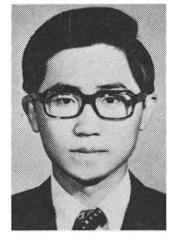
Yu-Keung Sze (top right) (PhD, physical chemistry, University of Waterloo, 1974) is a research chemist in the Separations Technology Section at Whiteshell Nuclear Research Establishment (WNRE). His work has dealt with solution chemistry of aqueous and organic solutions of electrolytes. His current interests include determination of basic flow sheet parameters for recovery of the main heavy elements from thorium fuels and studies of thermodynamic and kinetic features of the separation and recovery process. **Leonard James Clegg** (top left) (Dipl. Chem. Tech., Ryerson Polytechnical Institute, 1968) worked for several years on problems related to the chemistry of fuel reprocessing, i.e., actinide separations, purification, and analyses. More recently, he has worked on projects related to reactor safety. **Andrew Francis Gerwing** (bottom right) (BSc, chemistry, University of Manitoba, 1969) specializes in developing analytical methods for plutonium in its different oxidation states and for other actinides. He is currently involved in the design of equipment and method modification for the analysis of various ions in fuel reprocessing solutions using remote handling techniques. **George Robert Grant** (bottom left) (PhD,

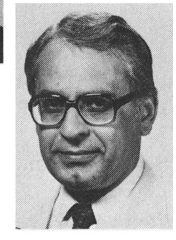
nuclear and radiochemistry, McGill University, 1961) has been with Atomic Energy of Canada Limited since 1963 and for the past five years has been a research chemist with the Separations Technology Section at WNRE. His duties have involved developing and testing of solvent extraction flow sheets suitable for reprocessing of thorium fuels.

NUCLEAR FUELS

METALLIC COMBINATIONS OF Pu-Th AND ^{233}U-Th OR Pu-Th AND ^{233}U-^{238}U FUEL CYCLES AS POSSIBLE ALTERNATIVES TO (Pu-U)O_2 IN LMFBRs

C. C. Lee
R. A. Karam

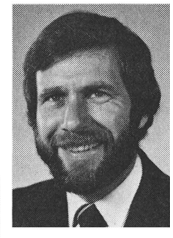


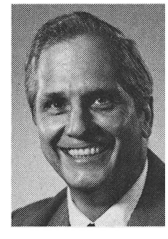


Chung-Chiang Lee (top) (BS, nuclear engineering, National Tsing Hua University, 1971; MS, 1974, and PhD, 1979, nuclear engineering, Georgia Institute of Technology) is currently a senior engineer with licensing and in-vessel safety analysis at Westinghouse Electric Corporation, Advanced Reactor Division, Madison, Pennsylvania. His interests are in the fields of reactor core design and safety, alternative fuel cycles, and the method development of core accident analysis. **R. A. Karam** (BChE, chemical engineering, 1958, and MS, 1960, and PhD, 1963, nuclear engineering, University of Florida) is professor at the Georgia Institute of Technology. Prior to coming to Georgia Tech in 1972 he worked at Argonne National Laboratory for nine years. His current interests include investigative research directed toward achieving fundamental understanding of physical problems, particularly the transport of neutrons, and alternate fuel cycles.

DEVELOPMENT OF HIGH-URANIUM-LOADED U_3O_8-Al FUEL PLATES

G. L. Copeland
M. M. Martin

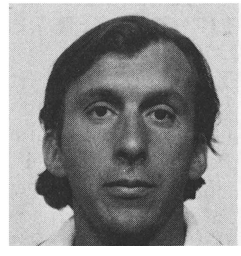




George L. Copeland (top) (BS, University of Alabama, 1963; MS, Rensselaer Polytechnic Institute, 1965; PhD, metallurgical engineering, University of Tennessee, 1975) is currently involved in studies on the management of contaminated metal waste at the Oak Ridge National Laboratory (ORNL). His experience has primarily been in process and material development for fuels, absorbers, cladding, and structurals for nuclear reactors and components. **Melvin M. Martin** (BS, chemical engineering, University of Maryland, 1957) is a member of the Metals and Ceramics Division at ORNL, where he is currently leader of iridium alloy disk production in the Space and Terrestrial Systems Programs. Before coming to ORNL in 1959, he spent two years in the International School of Nuclear Science and Engineering at Argonne National Laboratory. His current interests are in the fabrication of cladding for space power sources and development of research reactor fuel plates.

THE PREDICTION OF TRANSIENT FISSION-GAS RELEASE AND FUEL MICROCRACKING UNDER SEVERE CORE-ACCIDENT CONDITIONS

J. Rest

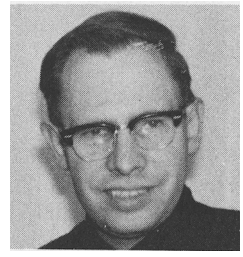


Jeff Rest (PhD, physics, University of Wisconsin-Milwaukee, 1972) is group leader of the Analytical Modeling Group in the Materials Science Division at Argonne National Laboratory. His

technical interests currently are in nuclear fuel-rod performance modeling, the response of nuclear fuel during accident conditions, the behavior of fission gases, and the behavior of helium and tritium in fusion-system materials.

THE POSSIBLE IMPACT OF FUEL PELLET CRACKING ON INFERRED GAP CONDUCTANCE AND FUEL STORED ENERGY

D. D. Lanning

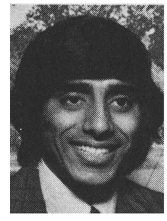


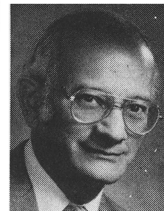
Donald D. Lanning (BA, physics, University of Oregon, 1967; MS, nuclear engineering, University of Washington, 1979) has been at Pacific Northwest Laboratory (PNL) since 1967. He has held various assignments related to fuel handling and test fuel production. He is currently project manager for a program on steady-state irradiation testing and computer modeling of fuel rods sponsored by the U.S. Nuclear Regulatory Commission.

RADIOACTIVE WASTE MANAGEMENT

INTERACTIONS OF BACKFILL MATERIALS WITH CESIUM IN A BITTERN BRINE UNDER REPOSITORY CONDITIONS

Sridhar Komarneni
Rustum Roy



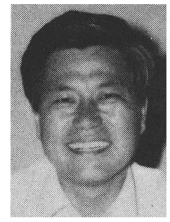


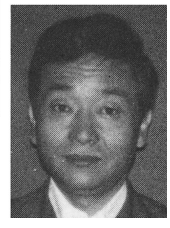
Sridhar Komarneni (top) (PhD, soil chemistry and mineralogy, University of Wisconsin-Madison, 1973) has been a research associate at the Materials Research Laboratory, The Pennsylvania State University, University Park, since 1976. He joined Penn State after two years of post-doctoral work in soil science at The University of Wisconsin-Madison. His primary research interests are in the crystal chemistry of use of clays, zeolites, and gels in nuclear waste disposal and in the chemistry of alteration and interactions of nuclear waste solids with wall rock under repository conditions. **Rustum Roy** (PhD, ceramics, The Pennsylvania State University, 1948) is professor of geochemistry and of solid state at Penn State. He has also been the director of the Penn State Materials Research Laboratory, University Park, since 1962. His main research interests are materials preparation and characterization, crystal chemistry, synthesis, stability, phase equilibria and crystal growth in nonmetallic systems, ultrahigh pressure reactions in solids, and chemistry and physics of noncrystalline solids.

RADIATION BIOLOGY AND ENVIRONMENT

ENVIRONMENTAL RADIATION MONITORING SYSTEM DEVELOPMENT FOR ATMOSPHERIC PLUMES FROM LIGHT WATER REACTOR NUCLEAR POWER PLANTS

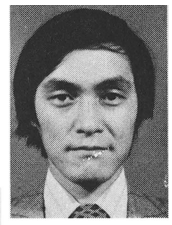
Tachimori Ohba
Satsuharu Takimoto
Yoshio Kitada
Tomio Tsunoda
Akira Kobayashi
Kenji Ishida

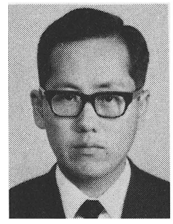


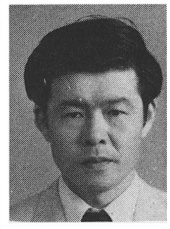


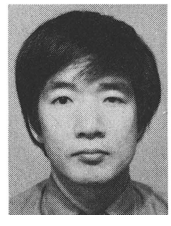
Tachimori Ohba (top) (BS, electrical engineering, Tokyo Institute of Technology, 1959) has been a manager of the Operation and Maintenance Department of the Tokyo Electric Power Company Fukushima Daiichi Nuclear Power Station since 1981. His general field of interest has been radiation safety control. His recent interests include environmental radiation monitoring. **Satsuharu Takimoto** (bottom) (BS, industrial

chemistry, Ibaragi University, 1961) has been a manager of the Radiation and Protection Section of the Tokyo Electric Company Fukushima Daini Nuclear Power Plant construction office since 1980. His general field of interest has been radiation protection. His recent interests include environmental radiation monitoring. **Yoshio Kitada** (top right) (BS, 1972, and MS, 1974, nuclear engineering, Hokkaido University) joined Nippon Atomic Industry Group Co., Ltd. (NAIG), Nuclear Research Laboratory in 1974, and has been engaged in the study of developing the environmental radiation monitoring system for the light water reactor plume. His recent interests include fluctuation analysis of random data, structural dynamics of nuclear power plants, and environmental radiation monitoring. **Tomio Tsunoda** (top left) (BS, Waseda University, 1961) is a manager of the Reactor Engineering Section of NAIG Nuclear Research Laboratory, and has been engaged in the development of the reactor diagnosis system. His recent interests include reactor noise analysis and environmental radiation monitoring. **Akira Kobayashi** (bottom right) (BS, electric communication engineering, Shinshu University) is employed in the Nuclear Energy Group of Toshiba Corporation. His general field of interest throughout his career has been the control and instrumentation of nuclear power plants. His recent interests include the environmental radiation monitoring of nuclear power plants. **Kenji Ishida** (bottom left) (BS, 1971, and MS, 1973, nuclear engineering, Nagoya University) is a research engineer at the Central Research Institute of the Electric Power Industry. He is currently investigating individual exposure surveillance techniques in the nuclear power plant.





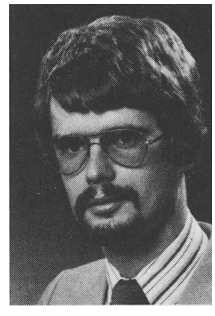




ANALYSES

DETERMINATION OF THE CONCENTRATIONS OF ALPHA-EMITTING ISOTOPES

Ralph-D. von Dincklage



Ralph-D. von Dincklage (Dr.rer.nat., experimental nuclear physics, University of Göttingen, 1977) has been with Dornier System GmbH since 1979. He has performed experimental studies on nuclei far from stability in Göttingen, Germany, and Berkeley, California, on internal conversion and x-ray fluorescence, on risk analysis of reprocessing plants, and on development of monitoring devices for reprocessing plants. His current technical interest is nuclear instrumentation.