



## AUTHORS — NOVEMBER 1983

### FISSION REACTORS

#### EXPERIMENTAL STUDIES ON THE USE OF LIQUID LEAD IN A MOLTEN SALT NUCLEAR REACTOR

**M. Broc** (top) (Dr. Univ., Paris, 1977) has had much experience in the field of molten salts. He is currently in charge of realization and operation of liquid-metal circuits intended for corrosion experiments at the Corrosion, Electrochemistry, and Fluid Chemistry Service at the Commissariat à l'Énergie Atomique (CEA), France. **J. Sannier** (center) (Ingénieur, Ecole Nationale Supérieure de Chimie de Paris, 1955) is a senior engineer specialist of corrosion, especially by liquid metals and gases at CEA. **G. Santarini** (bottom) (Ingénieur, Ecole Nationale Supérieure des Mines de St-Etienne, 1971; Dr. Sci., Paris, 1976; Agrégé Sciences, physiques, Paris, 1976) is the head of a research group at CEA working on molten salts and liquid metals. His general fields of interest are corrosion, physical chemistry, and electrochemistry.

*M. Broc  
J. Sannier  
G. Santarini*



#### THE NUCLEAR REACTOR STRATEGY BETWEEN FAST BREEDER REACTORS AND ADVANCED PRESSURIZED WATER REACTORS

**Walter Seifritz** (Dr. Ing., nuclear technology, University of Hanover, Federal Republic of Germany) is head of the Physics Division at the Swiss Federal Institute for Reactor Research (EIR), Würenlingen, Switzerland. Since 1964, he has been engaged in research on reactor noise analysis, reactor physics and dynamics, general energy problems, hydrogen energy, and nuclear fusion. He was working with the Nuclear Research Center Karlsruhe, the University of Hanover, and the Organization for Cooperation and Development Halden Reactor Project. In 1973 he joined EIR. His current research interests are concerned with the role of nuclear fission and fusion energy in a global future energy mix.

*Walter Seifritz*



### AN AXIALLY HETEROGENEOUS CORE CONCEPT FOR LARGE LMFBRs AND ITS HCDA BEHAVIOR

**Kotaro Inoue** (top right) (BE, mechanical engineering, University of Tokyo, Japan, 1964; PhD, nuclear engineering, 1976) has engaged in reactor physics, safety analysis, systems design, solar energy development, and fusion systems research. He is presently a manager in the fast breeder reactor (FBR) core systems unit at the Energy Research Laboratory (ERL), Hitachi Ltd., Japan. **Kazuo Azekura** (top left) (MS, nuclear engineering, Osaka University, Japan, 1973) is a research staff member at the ERL. His research interests include reactor physics and hypothetical core disruptive accident analysis of FBRs. **Katsuyuki Kawashima** (center right) (MS, physical engineering, Tokyo Institute of Technology, Japan, 1977) is a research staff member at the ERL. His research interests include the areas of reactor physics and the optimization of FBR core systems. **Setsuo Kobayashi** (bottom left) (PhD, reactor physics, University of Kyoto, Japan, 1966) has engaged in nuclear technology research and development work at the Central Research Laboratory, Hitachi Ltd., the Battelle-Pacific Northwest Laboratories, and the Power Reactor and Nuclear Fuel Development Corporation. He is presently a manager in the Nuclear Power System Division at the ERL. **Yoshio Watari** (bottom right) (M. Eng., nuclear engineering, University of Osaka, Japan, 1969) is a senior engineer in the Advanced Reactor Department of Hitachi Works, Hitachi Ltd. He is presently responsible for core and fuel design of FBRs and heavy water reactors.

*Kotaro Inoue  
Kazuo Azekura  
Katsuyuki Kawashima  
Setsuo Kobayashi  
Yoshio Watari*



### COMMERCIAL NUCLEAR FUEL REPROCESSING APPLYING THE SAFAR PROCESSING CONCEPT

**Milton H. Campbell** (top) (BS, chemistry, Montana State University, 1951; MS, nuclear engineering, University of Washington, 1961; Alexander Hamilton Institute Modern Business Program, 1970) joined the General Electric Company at Richland, Washington, where he had increasing responsibilities in the control and research and development laboratories. In 1974 he joined the Fuel Reprocessing Department of the Exxon Nuclear Company, Inc., as a senior fuel reprocessing engineer and worked on safeguards program development and laboratory planning for Exxon's Nuclear Fuel Recovery and Recycling Center. Campbell has worked in the Research Department since 1978 and was recently program manager for the Diversion Resistance Program sponsored by the Electric Power Research Institute (EPRI). **R. E. Tomlinson** (bottom) (BS, chemistry and mathematics, Salem College, West Virginia, 1938) is a senior staff engineer with Exxon Nuclear Company, Inc., and has been active in radiochemical process engineering since 1943. He worked in various capacities at Hanford on development, design, and operation of facilities for the recovery of plutonium, the uranium recovery operation, and the waste processing operations. Tomlinson joined Exxon Nuclear in 1971 and worked

*Milton H. Campbell  
R. E. Tomlinson  
Roy Nilson  
R. F. Williams*



extensively on safety analysis and environmental reports for a proposed Exxon site in Tennessee. Since 1977 he has performed reprocessing studies under contract with Oak Ridge National Laboratory and with EPRI. **Roy Nilson** (right) (BA, physics and mathematics, Whitman College, 1950; MS, 1952, and PhD, 1956, nuclear physics, University of Illinois) is manager of corporate licensing for Exxon Nuclear Company, Inc. From 1955 to 1958, he was a reactor physicist for General Electric Company at Hanford, becoming the supervisor of reactor physics in 1958, and in 1965, manager of process and reactor development. Nilson later joined Douglas United Nuclear and in 1969, came to Exxon Nuclear in Richland as its manager of quality assurance and licensing, assuming his present position in 1978. A photograph and a biography for **R. F. Williams** were not available.



### OPERABILITY AND MAINTAINABILITY OF THE BARNWELL NUCLEAR FUEL PLANT: A KEY ISSUE

**Robert E. Brooksbank, Sr.** (top) (BS, chemical engineering, Tri-State University, 1949; chemical engineering, University of Tennessee, 1951) is currently employed by Bechtel National, Inc., following a 30-year career with the Oak Ridge National Laboratory in the area of pilot planting nuclear fuel reprocessing and remote fabrication flow sheets. In his current capacity, he is charged with maintaining a current awareness of the back-end of the fuel cycle for the Bechtel organization. He was recently elected a fellow in the American Nuclear Society (1983) for his accomplishments in the nuclear fuel cycle. **Ray O. Sandberg** (MS, chemical engineering, Washington University, 1960; MBA, business management, Golden Gate University, 1976) is manager of fuel cycle economics with the Nuclear Fuel Operations Group of Bechtel National, Inc. Since joining Bechtel in 1967, he has been involved primarily with technical and economic analyses of the nuclear fuel cycle and fuel cycle facilities. His current interests are in the areas of nuclear fuel reprocessing and overall fuel cycle economics.

*Robert E. Brooksbank, Sr.  
Ray O. Sandberg*

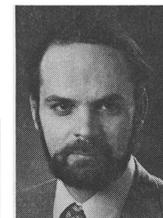
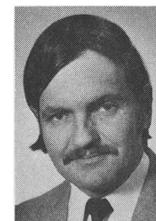


## NUCLEAR FUELS

### POSTIRRADIATION BEHAVIOR OF UO<sub>2</sub> FUEL I: ELEMENTS AT 220 TO 250°C IN AIR

**J. Novak** (top) (BA Sc., engineering science, University of Toronto, 1974) is employed in Central Nuclear Services, Nuclear Generation Division of Ontario Hydro. Since 1976 he has been engaged in the areas of nuclear fuel production and development. His current technical interests include behavior of irradiated fuel in air, UO<sub>2</sub> powder characteristics, and fuel performance improvement. **Ian J. Hastings** (center) (PhD, metallurgical science, University of Queensland, 1968) is head of the Fuel Properties and Behavior Group in the Fuel Materials Branch at the Chalk River Nuclear Laboratories (CRNL) of Atomic Energy of Canada Limited. His current interest is in oxide fuel behavior under irradiation, particularly release of short-lived fission products under normal and accident conditions. **Elio Mizzan** (bottom) (BA Sc., chemical engineering, University of

*J. Novak  
Ian J. Hastings  
Elio Mizzan  
Real J. Chenier*



Toronto, 1949) is a supervisor at the Fuel Materials Branch Hot Cell Facility at CRNL. His interests have been in the areas of postirradiation examination of reactor fuels and materials, particularly postdefect handling of spent UO<sub>2</sub> fuel. **Real J. Chenier** (right) is a research technician in the Fuel Materials Branch at CRNL. His current research responsibility is operation of the postirradiation metallographic facilities.



## RADIOACTIVE WASTE MANAGEMENT

### THE REDUCTION OF NEPTUNIUM(VI) BY BASALT AND OLIVINE

**Arnold M. Friedman** (top) (PhD, nuclear chemistry, Washington University, 1953) is a senior chemist at Argonne National Laboratory (ANL), where he has worked since 1953. His interests are in nuclear structure, application of nuclear techniques to medicine, and radioactive waste disposal. He is currently a visiting professor at the University of Chicago. **Sherman Fried** (PhD, University of Chicago) worked at Northwestern University from 1942 to 1943 before coming to the Metallurgical Laboratory (now ANL). He worked at the Radiation Laboratory, University of California, from 1960 to 1966. His field of research has continued to be the chemistry of the actinide elements with interest in basic research as well as with applications to special problems. A senior scientist, he is involved in studies of migration of actinides from radionuclide repositories into the environment. Photographs and biographies for **Nicholas J. Susak** and **J. C. Sullivan** were not available.

*Arnold Friedman  
Sherman Fried  
Nicholas J. Susak  
J. C. Sullivan*



### ELECTRODECONTAMINATION OF GLOVE-BOX MATERIALS

**Everett L. Childs** (top) (BS, chemical technology, Iowa State University, 1949) is a research specialist with Rockwell International, Rocky Flats Plant. He has worked in analytical chemistry, electroplating, and electrochemistry. Recent work has been in corrosion technology. He has been with Rocky Flats Plant since 1952. **John R. Winkel** (MS, metallurgical engineering, Colorado School of Mines) is a senior research engineer with Rockwell International, Rocky Flats Plant. He has worked for six years in corrosion research and failure analysis of metals. He is currently working with several production and task teams established to transfer design technology to manufacturing. He has provided engineering, failure, and systems analyses to a variety of programs.

*Everett L. Childs  
John R. Winkel*



## ECONOMICS

### THE NUCLEAR REACTOR STRATEGY BETWEEN LIGHT WATER REACTORS AND ADVANCED PRESSURIZED WATER REACTORS

**Walter Seifritz** (Dr. Ing., nuclear technology, University of Hanover, Federal Republic of Germany) is head of the Physics Division at the Swiss Federal Institute for Reactor Research

*Walter Seifritz*



(EIR), Würenlingen, Switzerland. Since 1964, he has been engaged in research on reactor noise analysis, reactor physics and dynamics, general energy problems, hydrogen energy, and nuclear fusion. He was working with the Nuclear Research Center Karlsruhe, the University of Hanover, and the Organization for Cooperation and Development Halden Reactor Project. In 1973 he joined EIR. His current research interests are concerned with the role of nuclear fission and fusion energy in a global future energy mix.

## MATERIALS

### A NEW POSTIRRADIATION MECHANICAL BEHAVIOR TEST—THE MINIATURIZED DISK BEND TEST

*Michael P. Manahan*

**Michael P. Manahan** (BA, physics, Michigan State University, 1975; BS, mathematics, Michigan State University, 1975; MS, nuclear reactor physics, Columbia University, 1978; ScD, nuclear materials engineering, Massachusetts Institute of Technology, 1982) is principal research scientist in the Nuclear Technology and Physical Sciences Department of Battelle's Columbus Laboratories. His responsibilities include the coordination and management of multidisciplinary research programs related to miniaturized specimen technology. His current research interests include further development and application of test methods to deliver information such as creep response, fatigue behavior, stress relaxation behavior, residual plastic stress/strain, and ductile/brittle transition temperature using miniature specimens.

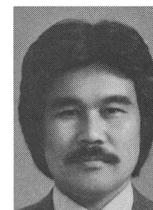


## HEAT TRANSFER AND FLUID FLOW

### HEAT REMOVAL TESTS FOR PRESSURIZED WATER REACTOR CONTAINMENT SPRAY BY LARGE-SCALE FACILITY

*Yasuo Motoki  
Mitsuo Naritomi  
Mitsugu Tanaka  
Gunji Nishio  
Kazuichiro Hashimoto  
Susumu Kitani*

**Yasuo Motoki** (top right) (BS, mechanical engineering, Muroran Institute of Technology, Japan, 1971) is a research engineer at the Japan Atomic Energy Research Institute (JAERI). He is currently engaged in the Very High-Temperature Reactor Project to design high-temperature gas-cooled reactor. He is interested in heat transfer analysis in gas-cooled reactor components. **Mitsuo Naritomi** (top left) (health physics, Radiological Technology School and Health Sciences of Kyushu University, Japan, 1962) is a research engineer at JAERI. He is engaged in iodine removal tests by containment spray of JAERI model containment (JMC) and the analysis of iodine removal. He is currently interested in radioiodine behavior in a high-level radiation field. **Mitsugu Tanaka** (bottom right) (Doctor of Engineering, chemical engineering, University of Kyushu, Japan, 1972) is a senior engineer at JAERI working in the field of light water reactor (LWR) safety. He is currently engaged in the ROSA-IV Program for investigation of pressurized water reactor small-break loss-of-coolant accidents and operational transients. **Gunji Nishio** (bottom left) (chemical engineering, Professional Technology



School of Tokyo Institute of Technology, Japan, 1957) is a principal engineer at JAERI. He is engaged in the development of containment safety analysis of LWRs to demonstrate the effectiveness of heat and iodine removals by JMC. He is interested in fire accidents in nuclear plants. **Kazuichiro Hashimoto** (top) (BS, electrical engineering, Keio University, Japan, 1976) is a research engineer at JAERI. He is now engaged in the Fire/Filter Test, which will demonstrate the safety of reprocessing plants under the solvent fire condition. He is interested in protection against fission product release in nuclear plants and also in the research on severe core damage in LWRs. **Susumu Kitani** (bottom) (MS, 1955, and DSci., 1959, chemistry, Nagoya University, Japan) is general manager of the Reactor Safety Laboratory III at JAERI. Since 1958, he has been engaged in JMC tests as the project leader and has worked on the nuclear air-cleaning technology of LWRs, fast breeder reactors, and spent fuel reprocessing plants.



**SIMMER-II RECRITICALITY ANALYSES FOR A HOMOGENEOUS CORE OF THE 300-MW(electric) CLASS**

*Werner Maschek  
Margaret W. Asprey*

**Werner Maschek** (top) (diploma, physics, 1972; PhD, technical physics, Technical University Graz, Austria, 1974) has been a scientist at the Institute of Neutron Physics and Reactor Technology at the Karlsruhe Nuclear Research Center (KfK), Federal Republic of Germany since 1974. He is currently a guest scientist at Los Alamos National Laboratory (LANL). His main interests are fast breeder reactor (FBR) safety and neutron physics. **Margaret W. Asprey** (BS, mathematics, College of Santa Fe, 1966; MS, nuclear engineering, University of New Mexico, 1968) has been a scientist at LANL since 1967. Her principal professional interests are neutronic-related computer programming for FBRs and nuclear weapons.



**THE NONCONDENSABLE GAS EFFECTS ON LOSS-OF-COOLANT ACCIDENT STEAM CONDENSATION LOADS IN BOILING WATER REACTOR PRESSURE SUPPRESSION POOL**

*Yutaka Kukita  
Ken Namatame  
Isao Takeshita  
Masayoshi Shiba*

**Yutaka Kukita** (top right) (Dr. Eng., mechanical engineering, University of Tokyo, Japan, 1975) is a research engineer in the Nuclear Safety Research Department (NSRD) at the Japan Atomic Energy Research Institute (JAERI). He worked for eight years for subscale and full-scale boiling water reactor (BWR) pressure suppression test programs and is currently involved in the research of pressurized water reactors small-break loss-of-coolant accident (LOCA) and abnormal transients. **Ken Namatame** (top left) (BS, mechanical engineering, 1960) was a senior engineer at JAERI until 1982 and is currently chief of the BWR Safety Analysis Code Evaluation Office at the Institute of Nuclear Safety, Japan. **Isao Takeshita** (bottom right) (BS, nuclear engineering, University of Tokyo, Japan) is a research engineer in NSRD at JAERI. He is currently involved in the planning of a new criticality safety experiment program. **Masayoshi Shiba** (bottom left) (MS, mechanical engineering, Waseda University, 1959) has been the general manager of the Reactor Safety Laboratory in NSRD at JAERI and has been responsible for experimental programs concerning the thermal hydraulics of light water reactor LOCA and emergency core cooling systems.



**NUCLEAR CRITICALITY SAFETY CONSIDERATIONS IN DESIGN OF DRY FUEL ASSEMBLY STORAGE ARRAYS***Edward T. Tomlinson  
C. L. Brown*

**Edward T. Tomlinson** (top) (BS, 1972; MS, 1974, and PhD, 1976, nuclear engineering, University of Tennessee) was an engineer at Oak Ridge National Laboratory from 1972 to 1980 where he worked in the area of fast reactor analysis. From 1980 to 1982 he was employed at the Tennessee Valley Authority in their Nuclear Fuels Branch. He is currently employed at Bettis Atomic Power Laboratory in the Nuclear Materials Management Section as a criticality control engineer. **C. L. Brown** (BS, chemistry, University of Utah, 1947) is manager of criticality engineering and analysis at Rockwell Hanford Operations (Rockwell). He has over 20 years of experience in the application of criticality safety to nuclear fuel cycle facilities and is a fellow of the American Nuclear Society. Current interests are focused on new production activities at Rockwell.

