



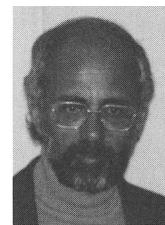
AUTHORS — MAY 1987

CRITICAL REVIEW

TRANSPORT OF POLLUTANTS: SUMMARY REVIEW OF PHYSICAL DISPERSION MODELS

*George Yadigaroglu
Hector A. Munera*

George Yadigaroglu (top) (Dipl.-Ing., mechanical engineering, Ecole Polytechnique Fédérale, Lausanne, Switzerland, 1962; ScD, nuclear engineering, Massachusetts Institute of Technology, 1970) is professor of nuclear engineering at the Swiss Federal Institute of Technology in Zurich (ETHZ). He was previously professor at the University of California, Berkeley, and from 1979 to 1982 he also served as head of the Nuclear Regulatory Service of the Greek Atomic Energy Commission. His research is centered around reactor safety with special emphasis on thermal hydraulics as well as probabilistic methods. **Hector A. Munera** (BSc, chemical engineering, University of Antioquia, Medellin, Colombia, 1966; MSc, radiation studies, Surrey University, Guildford, England, 1971; MSc, systems engineering, National University, Bogota, Columbia, 1974; PhD, nuclear engineering, University of California, Berkeley, 1978) was a visiting scientist at the Nuclear Engineering Laboratory of ETHZ during 1984 and 1985. Currently, he is with Tecnicontrol in Bogota, Columbia, where he is engaged in consulting activities. He has done extensive research on the foundations of nondeterministic decision making, where he has developed an axiomatic alternative theory.



NUCLEAR SAFETY

THE IMPORTANCE OF FISSION PRODUCTION/AEROSOL INTERACTIONS IN REACTOR ACCIDENT CALCULATIONS

*Roger D. Spence
Anthony L. Wright*

Roger D. Spence (right) (BS, chemical engineering, Virginia Polytechnic Institute and State University, 1971; PhD, chemical engineering, North Carolina State University, 1975) is currently working on waste immobilization and stabilization at Oak Ridge National Laboratory (ORNL). During the work reported, he was



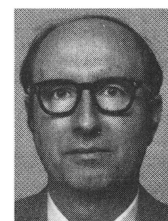
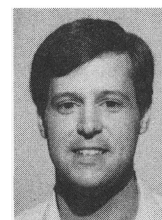
measuring fission product/aerosol interactions for the U.S. Nuclear Regulatory Commission. **Anthony L. Wright** (right) (PhD, aeronautical engineering, University of Minnesota, 1976) is a research staff member at ORNL. His current interests relate to aerosol behavior in light water reactor core melt accidents, including the performance of aerosol deposition and resuspension experiments and the validation of aerosol-transport computer codes.



THE ABSORPTION OF GASEOUS IODINE BY WATER DROPLETS

Michael F. Albert (top) [BS, 1982, and MS, 1985, chemical engineering, University of Tennessee (UT)] is presently a project engineer in Waste Management for Westinghouse Materials Company of Ohio (WMCO). Before joining WMCO he was associated with Oak Ridge National Laboratory (ORNL) where he studied iodine absorption. He is currently involved in denitration studies and determining an economic discard limit for uranium. **Jack S. Watson** (center) (BS, 1958; MS, 1962; and PhD, 1967, chemical engineering, UT) is a member of the Chemical Technology Division of ORNL and a parttime staff member of the Department of Chemical Engineering at UT. He has been with ORNL for ~30 years and associated with the university for almost 20 years. His research has been principally with separation techniques and their uses in fission, fusion, and other energy systems. **Robert P. Wichner** (bottom) (BS, 1954, and MS, 1955, chemical engineering, University of Cincinnati; PhD, engineering science, UT, 1965) has been at ORNL for ~30 years. He has contributed to reactor development, environmental transport, and reactor safety research programs. At the time of this writing, he was the ORNL manager for research for the U.S. Nuclear Regulatory Commission related to fission product behavior in reactor accident environments. Currently, he is in the Engineering Technology Division where he manages programs for the National Aeronautics and Space Administration dealing with materials for advanced solar dynamic power systems.

*Michael F. Albert
Jack S. Watson
Robert P. Wichner*



FUEL CYCLES

DEVELOPMENT OF THERMAL PLUTONIUM RECYCLING

Horst Roepenack (top) [mechanical engineering, Munich Technical University, Federal Republic of Germany (FRG), 1963] is general manager of Alkem GmbH, Hanau, FRG. Since 1964 he has been active in the nuclear fuel cycle industry. Since 1978 he has been responsible for research and development, manufacturing, and quality assurance at Alkem. **Fritz U. Schlemmer** (bottom) (Dipl.-Ing., mechanical engineering, Technische Hochschule Darmstadt, FRG, 1966) joined the Reactor Division of Siemens/Kraftwerk Union AG in 1966, where he was engaged in nuclear engineering and design. Since 1974 he has been responsible for the performance of irradiation tests in light water reactors (LWRs), and since 1981 he has served as advisor in the Department of Fuel Performance Evaluation and Nuclear Fuel

*Horst Roepenack
Fritz U. Schlemmer
Gerhard J. Schlosser*



Service. **Gerhard J. Schlosser** (right) (Dipl. Phys., 1962, and Dr. rer. nat., 1976, Rheinisch-Westfälische Technische Hochschule Aachen, FRG) has worked in the field of nuclear core design of light and heavy water reactors since 1963. Since 1972 he has been responsible for the activities at Kraftwerk Union AG, Erlangen, FRG, in the nuclear design and demonstration of recycling of plutonium and uranium for closed-fuel cycles in LWRs.



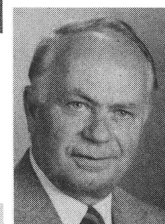
CHEMICAL PROCESSING

DROPLET DIAMETERS AND AXIAL MIXING IN PULSE COLUMNS IN THE COMPARISON OF THE AQUEOUS TO ORGANIC CONTINUOUS MODE OF OPERATION

Hiromichi Fumoto (top right) (BS, MS, and PhD, nuclear chemical engineering, University of Tokyo, Japan) has been a doctoral research associate at the Institute for Chemical Technology of Kernforschungsanlage Jülich (KFA) from 1979 to 1982, doctoral associate at the University of Tokyo from 1982 to 1983, and a senior researcher at the Industrial Research Institute, Japan, from 1983 to 1986. He is presently a liaison officer with the Indonesian National Atomic Energy Agency in Jakarta. His current interest is in the nuclear fuel reprocessing engineering study.

Erich Zimmer (top left) [Dr. rer. nat., chemistry, University of Mainz, Federal Republic of Germany (FRG), 1965] is a section head at the Institute of Chemical Technology (ICT) of KFA. He has dealt with various aspects of the nuclear fuel cycle: development of processes for nuclear fuel production, reprocessing (head-end and solvent extraction) of spent fuel, and treatment of nuclear wastes. **Erich R. Merz** (center right) (Dr. rer. nat., nuclear chemistry, University of Mainz, FRG, 1957; professor, nuclear technology, Rheinisch-Westfälische Technische Hochschule Aachen, FRG, 1970) has been director of the ICT of KFA since 1968. He is a member of the German Reactor Safety Commission. His work has been in the area of the end of the nuclear fuel cycle, including nuclear waste disposal. **Atsuyuki Suzuki** (bottom left) (BS, 1966; MS, 1968; and PhD, 1971, nuclear engineering, University of Tokyo, Japan) is a professor of nuclear engineering at the University of Tokyo. His current areas of interest include laser application for separation processes, stochastics of transport phenomena, and conflicts of technological society. **Ryohei Kiyose** (bottom right) (BS, physics, 1951; MS, chemical engineering, 1954; and PhD, nuclear engineering, 1976, University of Tokyo, Japan) is a professor of nuclear chemical engineering at the University of Tokyo and is interested in reprocessing and waste management technology and safety aspects of nuclear fuel facilities.

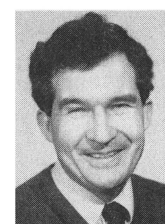
*Hiromichi Fumoto
Erich Zimmer
Erich R. Merz
Atsuyuki Suzuki
Ryohei Kiyose*



MODELING NUCLEAR DECONTAMINATION PROCESSES

Alexander P. Murray (BS, 1978, and MS, 1985, chemical engineering, Carnegie-Mellon University) has worked on chemical and electrolytic decontamination developmental projects since 1978. He has also worked in chemistry and engineering analyses related to the nuclear and energy industries. His current activities are decontamination, volume reduction, and radwaste processing.

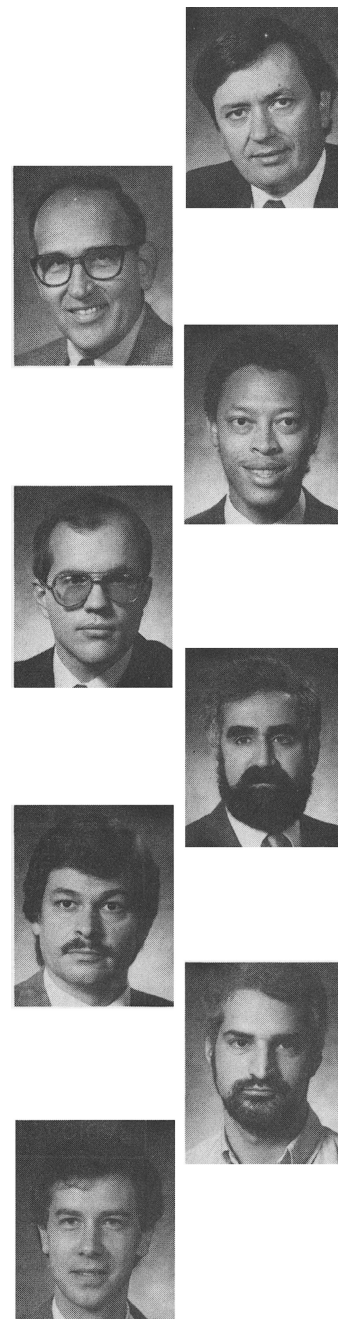
Alexander P. Murray



DEVELOPMENT AND OPERATION OF A UNIQUE CONVERSION/SOLIDIFICATION PROCESS FOR HIGHLY RADIOACTIVE AND FISSILE URANIUM

C. Phillip McGinnis (top right) (BS, 1971, and MS, 1980, chemical engineering, University of Tennessee, Knoxville) was the program manager for the Consolidated Edison Uranium Solidification Program (CEUSP) and chief of operations at the Radiochemical Processing Plant (RPP) while CEUSP was being processed. He is currently the manager of the Hazardous Waste Technology Program at the Oak Ridge National Laboratory (ORNL). This position is the interface between ORNL researchers and various sponsors who have needs in hazardous waste technology. **Emory D. Collins** (top left) (BS, chemical engineering, Auburn University, 1958; graduate studies, University of Tennessee, Knoxville, 1960-1963) has his main interest in the field of radiochemical process development. He is currently the manager of the Three Mile Island Assistance Program and is the manager of the RPP at ORNL. **Reginald Hall** (second from top right) (BS, chemical engineering, Tennessee Technological University, Cookeville, 1983) has been a development engineer at ORNL for the past 3 years, working on filtration studies of ammonia nitrate solutions. He is currently an operations engineer in the RPP. **J. Keith Johnson** (second from top left) (BS, chemical engineering, Mississippi State University, 1980) worked on the Coal Liquefaction and Light-Water Reactor Safety Programs at ORNL before joining the CEUSP staff. His current work focuses on the upgrading of the RPP. **Alan M. Krichinsky** (third from top right) (BS, chemical engineering, University of Maryland, College Park, 1974; MS, chemical engineering, University of Tennessee, Knoxville, 1981) was the technical group leader at ORNL's RPP during the CEUSP. Currently, he is the chief of operations for the RPP and is responsible for technical development studies at this facility. **Bradley D. Patton** (third from top left) (BS, 1976, and MS, 1978, chemical engineering, University of Kentucky, Lexington) was the technical task leader for CEUSP and is presently involved in other waste disposal projects. His main interests center around the disposal and treatment and rad-contaminated wastewater. **Joel T. Shor** (bottom right) (BS, 1979, and MS, 1986, chemical engineering, University of Tennessee, Knoxville) joined ORNL as a development associate in the Pilot Plant Section of the Chemical Technology Division. His current activities focus on development of radiochemical separations. **Raymond J. Vedder** (bottom left) (BS, chemical engineering, Oklahoma State University, 1979) is a development associate in the Chemical Technology Division of ORNL. He was responsible for some early development work and startup of the CEUSP and is currently involved with the design of remotely operated hot cell equipment.

*C. Phillip McGinnis
Emory D. Collins
Reginald Hall
J. Keith Johnson
Alan M. Krichinsky
Bradley D. Patton
Joel T. Shor
Raymond J. Vedder*



BORON-10 CONCENTRATION MEASUREMENTS USING THE SOLID-STATE NUCLEAR TRACK DETECTOR CR-39 AND AUTOMATIC IMAGE ANALYSIS

Thomas E. Blue (right) (PhD, nuclear engineering, University of Michigan, 1978) is an assistant professor of nuclear and mechanical engineering at Ohio State University. His present research

*Thomas E. Blue
T. Courtney Roberts
Rolf F. Barth
Joseph W. Talnagi
Fazlul Alam*



interests include radiation interaction, transport, and measurement in biology and medicine and, especially, fast neutron radiation therapy and boron neutron capture therapy (BNCT), using solid state nuclear track detectors and automatic image analysis. **T. Courtney Roberts** (top right) (MS, pathology, Ohio State University, 1986) is a first-year medical student at Ohio State University. His masters thesis is the basis for this paper and has as its subject the quantitation of boron using alpha track autoradiography. **Rolf F. Barth** (top left) (MD, Columbia University, 1964) is a professor of pathology at Ohio State University. Broadly, his interests are in the area of tumor immunology and more specifically on the potential use of monoclonal antibodies for the delivery of boron for BNCT and the development of animal models to test the therapeutic efficacy of BNCT. **Joseph W. Talnagi** (bottom right) (MSc, Ohio State University, 1979) is a senior research associate at the Nuclear Reactor Laboratory of Ohio State University. His research interests include reactor physics, nuclear instrumentation, and neutron activation analysis. **Fazlul Alam** (bottom left) (PhD, inorganic chemistry, University of Kentucky, 1982) is a research associate in the College of Pharmacy at Ohio State University. His research interests are in the areas of boron chemistry, BNCT, and the chemical modification of proteins.



HEAT TRANSFER AND FLUID FLOW

MONTE CARLO DEPARTURE FROM NUCLEATE BOILING RATIO LIMIT DEVELOPMENT USING FEW-CHANNEL THERMAL-HYDRAULICS CODE MODELS

Ross C. Anderson (top) (PhD, University of Virginia, 1983) is the lead core thermal-hydraulics engineer in Virginia Power's Nuclear Safety Analysis Group. He is responsible for thermal-hydraulics methods and applications, including statistical departure from nucleate boiling ratio methods, critical heat flux correlation qualification, and general reload support. **Kerry L. Basehore** (nuclear engineering degree, Massachusetts Institute of Technology, 1977) is the nuclear safety analysis manager for Virginia Power. He oversees the in-house system transient, core thermal-hydraulics and fuel performance analyses, which are required for reload support. From 1977 to 1980, he worked at Battelle Northwest Laboratories in the area of core thermal-hydraulics code development.

*Ross C. Anderson
Kerry L. Basehore*

