nuclear technology®

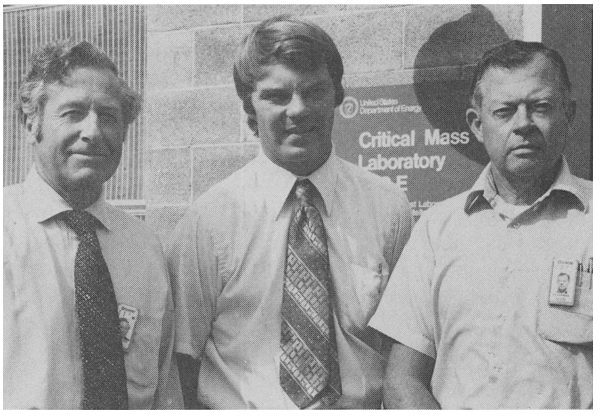
AUTHORS — MARCH 1979

REACTORS

CRITICAL SEPARATION BETWEEN SUBCRITICAL CLUSTERS OF LOW ENRICHED UO_2 RODS IN WATER WITH FIXED NEUTRON POISONS

S. R. Bierman
B. M. Durst
E. D. Clayton

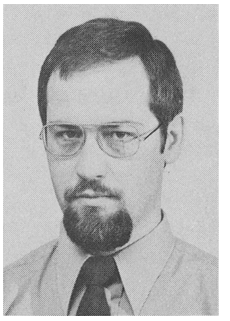
S. R. Bierman (right) (BS, chemical engineering, Texas Technological University, 1956; MS, nuclear engineering, University of Washington, 1963) has been involved both in the chemical processing industry and in criticality research and analysis. He is currently a staff scientist at the Critical Mass Laboratory at Battelle-Pacific Northwest Laboratories (PNL), where he has been active in both the generation of basic experimental criticality data and the utilization of these data in performing criticality analyses of production plant systems. He is currently vice-chairman of the Nuclear Criticality Safety Division of the American Nuclear Society (ANS). **B. M. Durst** (center) (BS, physics, University of Washington, 1971; MS, nuclear engineering, Louisiana State University, 1974) is a research scientist at PNL, where he has been actively involved in the generation of basic experimental and computational criticality data. **E. Duane Clayton** (left) (PhD, physics, University of Oregon, 1952) is currently associate manager of criticality analysis at PNL and is a research associate professor in the University of Washington's Department of Nuclear Engineering. He is a pioneer in criticality studies with plutonium, and since its inception in 1961, has been director of the Plutonium Critical Mass Laboratory of PNL. He is currently chairman of Work Groups 12 and 15 within Subcommittee ANS-8 (Fissionable Materials Outside Reactors) of the ANS Standards Committees. His current technical interests include most aspects of criticality measurements and studies.



INTERCOMPARISON OF AUTO- AND CROSS-POWER SPECTRAL DENSITY SURVEILLANCE SYSTEMS FOR SODIUM BOILING DETECTION IN FAST REACTORS

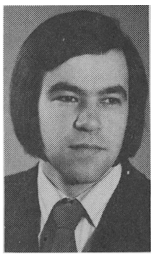
Joachim Ehrhardt

Joachim Ehrhardt (PhD, mechanical engineering, University of Karlsruhe, 1975) is a physicist at the Institut für Neutronenphysik und Reaktortechnik, Kernforschungszentrum Karlsruhe, Federal Republic of Germany. He works in the area of reactor noise analysis, especially in investigating methods for the detection of reactor malfunctions and the interpretation of time-dependent power noise spectra.



CHARACTERIZATION OF FRAGMENTED FUEL FROM A THERMAL FUEL-SODIUM INTERACTION

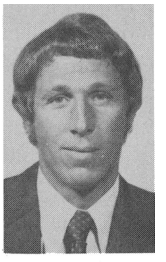
S. Gross
D. Vollath

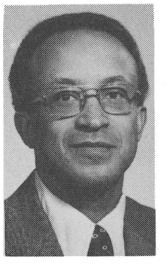


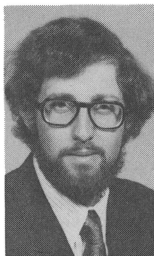
Sigurd Gross (top) (Dipl. Ing., chemical engineering, University of Karlsruhe, 1972) has been employed at the Kernforschungszentrum Karlsruhe (KFK) in the Federal Republic of Germany since 1972, working in the field of fast breeder safety experiments. He is now a staff member of the KFK Fast Breeder Project. **Dieter Vollath** (Dr. Phys., Technical University of Vienna, 1965; Univ. Doz., ceramics, Technical University of Vienna, 1976) has worked since 1965 in the Institute for Material Science and Solid-State Physics at KFK, working on the properties of fuel. He now works mainly on the development of new methods for quality control of fuel and its relation to operating behavior.

HYDROGEN TRANSPORT IN A TOROIDAL PLASMA USING MULTIGROUP DISCRETE-ORDINATES METHODOLOGY

B. R. Wienke
W. F. Miller, Jr.
T. J. Seed





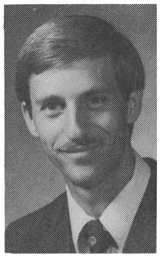


B. R. Wienke (top) (PhD, theoretical physics, Northwestern University, 1970) has been a staff member in the Theoretical Division of the Los Alamos Scientific Laboratory (LASL) since 1973. His interests lie in the areas of particle/nuclear theory, transport, and computational physics. **W. F. Miller, Jr.** (center) (PhD, nuclear engineering, Northwestern University) is group leader of the Transport and Reactor Theory Group at LASL and has been at LASL since 1974. His research interests are in numerical modeling particle transport, radiation shielding, and radioactive waste management. **T. J. Seed** (bottom) (PhD, nuclear engineering, University of Washington at Seattle, 1975) has been a staff member at LASL since 1975. His work has been in the area of neutron transport methods and code development.

REACTOR SITING

LOSS-OF-COOLANT ACCIDENTS IN SMALL COMPACT NUCLEAR REACTORS

R. C. Sanders
G. E. Mueller

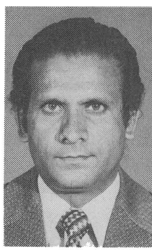


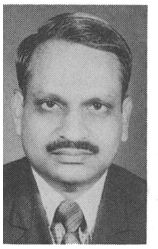
R. C. Sanders (top) (ScD, nuclear engineering, Massachusetts Institute of Technology, 1970) is an assistant professor of nuclear engineering at the University of Missouri-Rolla. He previously worked in the Division of Naval Reactors of the U.S. Department of Energy, where he participated in fluid systems design for nuclear propulsion plants. His current interests include reactor safety, reactor thermal-hydraulics, and waste heat utilization. **G. E. Mueller** (MS, nuclear engineering, University of Missouri-Rolla, 1977) is a graduate instructor and PhD candidate in nuclear engineering at the University of Missouri-Rolla. His current interests include reactor safety and reactor thermal-hydraulics.

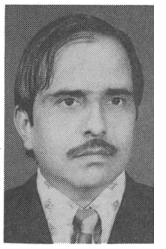
MATERIALS

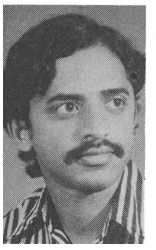
TRACER TECHNIQUES FOR THE INPUT ACCOUNTABILITY OF PLUTONIUM IN REPROCESSING PLANTS: MAGTRAP AND LEADTRAP

C. K. Mathews
H. C. Jain
V. D. Kavimandan
S. K. Aggarwal









C. K. Mathews (top, right) (PhD, nuclear chemistry, McMaster, 1964) has until recently headed the Mass Spectrometry Section in the Radiochemistry Division of the Bhabha Atomic Research Centre (BARC), Bombay. His fields of interest include postirradiation studies, nuclear material accounting, and studies on nuclear fission. More recently, he has moved to the Reactor Research Centre, Kalpakkam, Tamil Nadu, to head the Radiochemistry Laboratory there. **H. C. Jain** (top, left) (PhD, chemistry, Bombay, 1971) is currently responsible for the Mass Spectrometry Group in the Radiochemistry Division at BARC. He worked on fission and solution chemistry of actinides and had 15 months of training in the field of solvent extraction of actinides at the University of Liege, Belgium. **V. D. Kavimandan** (bottom, right) (MS, chemistry, Banaras, 1961) is currently working in the field of mass spectrometry and analytical work connected with the nuclear fuel cycle at BARC. His previous experience included catalytic oxidation of paraffins and chemical methods for the estimation of plutonium. **S. K. Aggarwal** (bottom, left) (BS, honors, Guru Nanak, 1972) is currently working in the applications of mass spectrometry and alpha spectrometry to various problems in nuclear fuel cycle and nuclear data measurement at BARC. His previous experience included radiometric methods for the determination of actinides and automation of mass spectrometers.

FUELS

SOME CALCULATIONS OF THE FAILURE STATISTICS OF COATED FUEL PARTICLES

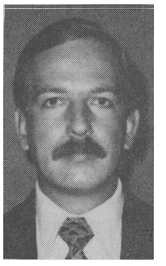
David G. Martin

David G. Martin (BA, 1953, MA, 1957, physics, University of Cambridge; PhD, physics, University of Reading, 1965) is a section leader in the Metallurgy Division at the Atomic Energy Research Establishment at Harwell, U.K. His work in the high-temperature reactor system included the mathematical modeling of coated fuel particles and the experimental study of physical property changes in graphite and fuel compacts during the course of their irradiation. His current interest is the modeling of thermal and fast reactor fuel pins.

MATERIALS

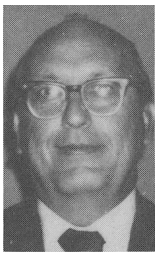
TRITIUM PERMEATION THROUGH Fe–2$\frac{1}{4}$ Cr–1 Mo STEAM GENERATOR MATERIAL

Terrence A. Renner
Donald J. Raue



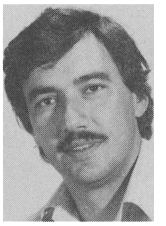
T. A. Renner (right) (PhD, physical chemistry, Yale University, 1972) is a member of the Sodium Technology Group of the Chemical Engineering Division at Argonne National Laboratory (ANL). His work in support of the liquid-metal fast breeder reactor (LMFBR) program has included tritium-hydrogen transport modeling studies in liquid-sodium coolant circuits and

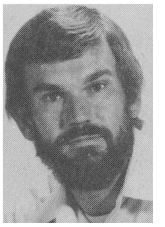
measurements of tritium permeation rates through structural materials. Currently, he is engaged in sodium cold-trap optimization studies that include both experimental and theoretical analysis techniques. **D. J. Raue** (right) (engineering, University of Illinois) has been at ANL since 1956 and has worked on problems related to uranium fuel preparation, fuel reprocessing, and waste reduction. Currently, he is an engineering assistant in the Sodium Technology Group of the Chemical Engineering Division. Over the past seven years, he has contributed to the development of on-line monitors for carbon, hydrogen, tritium, and oxygen, sampling devices, and leak detection systems for LMFBR sodium coolant.



FILTRATION OF SODIUM-FIRE AEROSOLS

A. Alexas
S. Jordan
W. Lindner

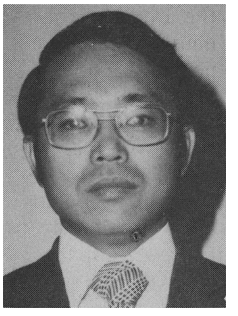




Alexander N. Alexas (top) (Dipl. Phys., Universities of Heidelberg and Karlsruhe, 1971) has been working since 1969 at the Nuclear Research Center at Karlsruhe (KRK), Federal Republic of Germany, in the area of nuclear safety. His current interests are out-of-pile experiments on liquid-metal fast breeder reactor (LMFBR) safety, with emphasis on UO_2 pin behavior and sodium fires. **S. Jordan** (center) (PhD, physical chemistry, University of Mainz, Germany, 1967) is a senior scientist at KFK. His current interests in the area of LMFBR safety are aerosol physics and sodium technology. **W. Lindner** (bottom) (Engineer, Technical University of Essen, Germany, 1968) has worked since 1968 at KFK in the area of fuel reprocessing and nuclear safety. His current interests are experiments on LMFBR safety.

THE EFFECT OF AXIAL STRESS ON THE TRANSIENT MECHANICAL RESPONSE OF 20% COLD-WORKED TYPE 316 STAINLESS-STEEL CLADDING

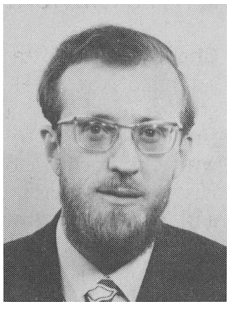
H. Yamada



Hisao Yamada (PhD, materials science, University of Utah, 1971) is a staff scientist in the Materials Science Division at Argonne National Laboratory. His work has been in the areas of deformation and fracture of metallic as well as ceramic materials. He is currently focusing his interests in the fuel-cladding mechanical interaction of various nuclear fuel elements.

CALCULATION OF THE INFLUENCE OF THE RADIAL TEMPERATURE GRADIENT ON CLADDING DILATATION

D. I. R. Norris

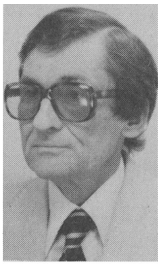


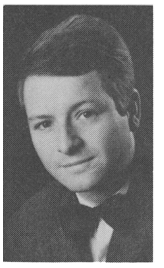
David Norris (PhD, physics, Cambridge University, 1964) works in the Fuel and Core Division of the Central Electricity Generating Board's Berkeley Nuclear Laboratories. Most of his research has been on radiation damage, particularly void swelling in metals. More recently, he has become interested in temperature gradient effects.

ANALYSIS

THE MASS SPECTROMETRIC DETERMINATION OF URANIUM-235 IN URANIUM HEXAFLUORIDE

W. Beyrich
G. Spannagel



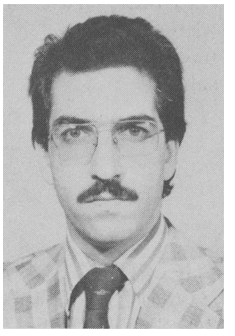


Wolfgang Beyrich (top) (PhD, physics, University of Marburg, 1957) is a senior scientist of the Commission of the European Communities (Euratom), delegated to the Safeguards Project of the Nuclear Research Center at Karlsruhe in the Federal Republic of Germany. He has had 17 years of experience in the application of mass spectrometry in research and industry, and since 1970, he has been responsible for the organization and evaluation of international intercomparison programs related to analyses of nuclear materials for safeguards. **Gert Spannagel** (PhD, physics, University of Heidelberg, 1968) is a research staff member of the Nuclear Research Center at Karlsruhe. He has worked in several areas, for example, radioecology, climatology, energy conversion techniques, cosmic rays, interplanetary material, and nuclear physics. At present, he is engaged in mathematical modeling.

TECHNIQUES

NEUTRON FLUENCE MEASUREMENTS WITH SOLID-STATE NUCLEAR TRACK DETECTORS: RESULTS OF A COMPARATIVE STUDY WITH GOLD AND INDIUM FOILS

A. Aframian

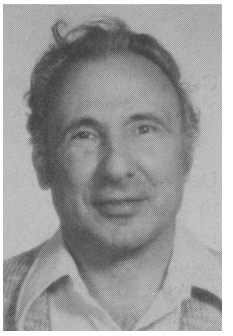


A. Aframian (PhD, physics, University of Birmingham, U.K., 1975) is presently a research staff member in the Nuclear Physics and Van de Graaff Divisions of the Tehran Nuclear Research Center in Iran. In general, his work has been concerned with subjects relating to fission product release and high-energy charged particles, including those of neutron detection and interactions. He has been a research scientist on contract with the International Atomic Energy Agency and a National Aeronautics and Space Administration co-investigator on the charged particle analysis of lunar materials and space radiation. His present areas of interest are the development and applications of nuclear track detectors for nuclear parameter measurements, fission studies, fusion of heavy charged particles, and super heavy nuclei.

REACTORS

BUBBLE WORTH VARIATION IN MOLTEN CORES FROM A HYPOTHETICAL CORE DISRUPTIVE ACCIDENT

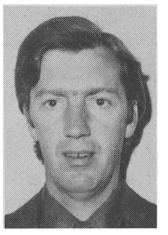
Charles R. Marotta



Charles R. Marotta (BS, physics, St. John's University, 1950) attended New York University from 1950 to 1955 for graduate studies in physics and mathematics. He developed one of the first multigroup diffusion digital computer programs for use with the nuclear powered aircraft projects of the early 1950's. His work and interests have been in the area of reactor theory and design, neutron, and gamma transport and Monte Carlo theory and associated problems in mathematical physics. At present, he is a senior member of the Transportation Branch of the U.S. Nuclear Regulatory Commission.

RADIOLOGICAL IMPLICATIONS OF PLUTONIUM RECYCLE AND THE USE OF THORIUM FUELS IN THERMAL POWER REACTOR OPERATIONS

H. F. MacDonald
S. Nair



Hugh F. MacDonald (top) (MA, physics, Oxford, 1963; PhD, optical properties of solids, Oxford, 1966) has worked in the Research Division of the Central Electricity Generating Board (CEGB) at Berkeley Nuclear Laboratories since 1969. He is a member of the Health Physics Research Section and has been concerned in the development of methods for the prediction of radioactive releases from nuclear installations and their application to emergency planning at nuclear power stations. His current interests focus on the radiological aspects of irradiated fuel handling and transportation. **Shankaran Nair** (MA, physics, Oxford, 1972; PhD, photofission and neutron-induced fission studies, Oxford, 1975) joined the Health Physics Research Section at CEGB at Berkeley in 1976, where he has worked on the development of computer codes for the prediction of radioactive inventories of nuclear fuels and structural materials. His current interests include reactor safety criteria and environmental pathways to humans.