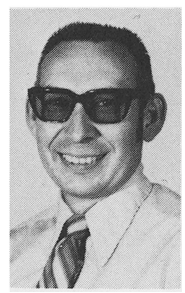
nuclear technology®

AUTHORS — MARCH 1975

REACTORS

THE CONCEPTUAL DESIGN OF A FAST SUBCRITICAL BLANKET FACILITY

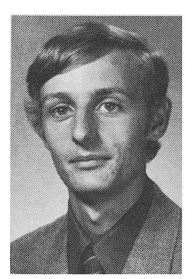
F. G. Krauss
K. O. Ott
F. M. Clikeman

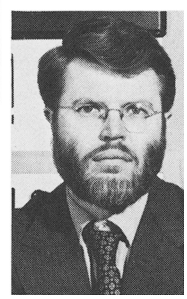


Frederick G. Krauss (top) (PhD, nuclear engineering, Purdue University, 1972) is a senior engineer at Bechtel Associates Professional Corporation in Ann Arbor, Michigan. He is presently working on the design of rad-waste systems and is shielding coordinator of the Greenwood Energy Center, Units 2 and 3, which are being designed for the Detroit Edison Company. Karl O. Ott (center) (PhS, theoretical physics, Georg August University, Goettingen, Germany, 1958) is a professor in the Department of Nuclear Engineering of Purdue University. A consultant to Argonne National Laboratory (ANL), he is presently with the Reactor Analysis and Safety Division of ANL as a recipient of the AUA-ANL Distinguished Appointment Award. His research interests are fast-reactor theory, fuel cycle analysis, and fast-reactor safety. Franklyn M. Clikeman (bottom) (PhD, nuclear physics, Iowa State University, 1962) is an associate professor in the Department of Nuclear Engineering of Purdue University. His present research interests include problems in neutron spectroscopy, gamma dosimetry, and reactor control and instrumentation.

POST-SHUTDOWN FISSION-PRODUCT DECAY HEATING FOR PLUTONIUM-239-FUELED FAST REACTORS

Richard Sporrer
John M. Christenson

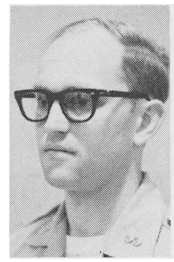


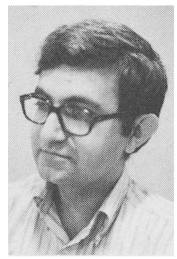


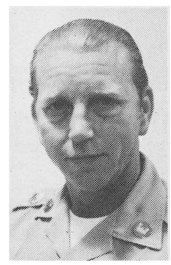
Richard Sporrer (left) (MS, nuclear engineering, University of Cincinnati, 1972) is an engineer in the safety analysis group, Westinghouse Electric Corporation, Advanced Reactors Division, for the Clinch River Breeder Reactor Plant (LMFBR Demonstration Plant). His current responsibilities include accident and radiological analyses. J. M. Christenson (PhD, University of Wisconsin, 1970) is assistant professor of nuclear engineering at the University of Cincinnati. His research interests are in the areas of nuclear reactor simulators and medical applications of nuclear technology.

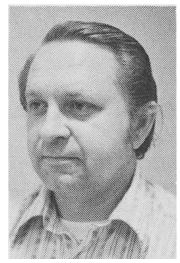
CHARACTERISTICS OF PULSED FAST NEUTRON-TO-GAMMA-RAY CONVERTERS

A. H. Kazi
T. A. Dunn
R. C. Harrison
D. O. Williams





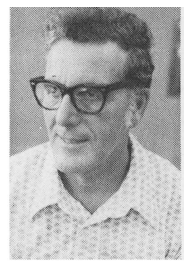


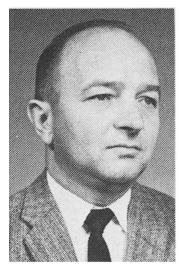


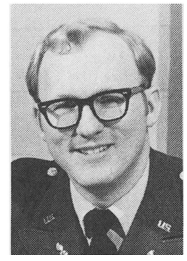
A. H. Kazi (top left) (PhD, nuclear engineering, Massachusetts Institute of Technology, 1961), chief of reactor operations at the Army Pulse Radiation Facility (APRF), Aberdeen Proving Ground, Maryland, has been involved in the design and operation of TRIGA reactors at General Atomic and in the design of fast breeder reactors at United Nuclear. He has been with the U.S. Army Ballistic Research Laboratories since 1966. His current interests include the design and operation of pulsed radiation sources, dosimetry, and transient radiation effects testing. Thomas A. Dunn (top right) (MS, nuclear engineering, Massachusetts Institute of Technology, 1971) is presently assigned to the APRF. Since arriving at the APRF in August 1973, he has concentrated on improving the capability of the Aberdeen pulse reactor by tailoring the radiation environment to customers' needs. Richard C. Harrison (bottom left) (BS, electrical engineering, Rensselaer Polytechnical Institute, 1952) is an electronics engineer in charge of instrumentation and data acquisition at the APRF. He joined the Ballistic Research Laboratories in 1966 and has worked primarily in the area of developing transient measurement techniques in support of operations and radiation effects tests at the APRF. Donald O. Williams (bottom right) is a certified reactor operator in charge of dosimetry at the APRF. His background includes 12 years in the Army power and research reactor field. His experience and current interests are in reactor operation with emphasis on static and transient neutron and gamma dosimetry.

HIGH RELIABILITY IN THE ELECTRONICS OF SAFETY SHUTDOWN CIRCUITS

M. A. Schultz
R. D. Guild
J. D. Chipps



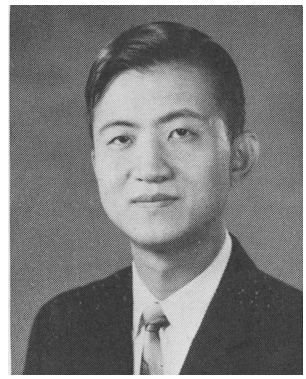




M. A. Schultz (top) (BS, electrical engineering, Massachusetts Institute of Technology, 1939) is professor of nuclear engineering at the Pennsylvania State University. He has been involved in nuclear electronics and safety since the start of the submarine thermal reactor program in 1949. R. D. Guild (center) (PhD, industrial engineering and management sciences, Northwestern University, 1968; MA, mathematics, Pennsylvania State University, 1958) is currently associate professor of industrial engineering at the Pennsylvania State University. His principal areas of interest are statistical quality control and reliability engineering. J. D. Chipps (bottom) (BS, physics, William and Mary, 1967; MS, industrial engineering, Pennsylvania State University, 1973) completed his graduate work in the field of reliability engineering and is now in charge of development of an integrated, computerized scheduling system for instructional services, training aids, and computer support at the U.S. Military Academy.

HEAT LOSS TO COLD STRUCTURE DURING AN LMFBR HYPOTHETICAL CORE-DISRUPTIVE ACCIDENT

W. L. Chen

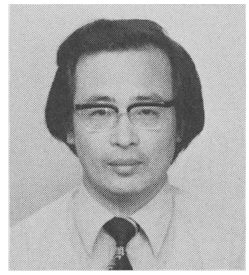


W. L. Chen (PhD, chemical engineering, University of Minnesota, 1970) is in the Reactor Analysis and Safety Division at Argonne National Laboratory. He is presently involved in the analysis of various hydrodynamic and thermal phenomena of LMFBR safety problems.

FUEL CYCLES

OPTIMIZATION OF REFUELING SCHEDULE FOR LIGHT-WATER REACTORS

Hiroshi Motoda
John Herczeg
Alexander Sesonske



Hiroshi Motoda (top) (PhD, nuclear engineering, Tokyo University, 1972) is a member of the Systems Analysis Section of the Atomic Energy Research Laboratory, Hitachi, Ltd., Japan. He has been engaged in in-core fuel management optimization of boiling water reactors. His current research interests include the reactor core management information system. John W. Herczeg (bottom left) (MS, physics, Bowling Green; MS, nuclear engineering, Purdue University, 1974) is currently working toward his PhD in nuclear engineering at Purdue University. In addition to fuel management, his interests lie in the area of thermal reactor safety and related problems. Alexander Sesonske (bottom right) (PhD, University of Delaware, 1950) is professor of nuclear and chemical engineering at Purdue University. In addition to nuclear fuel management, his interests include nuclear reactor engineering and liquid-metal heat transfer.

CHEMICAL PROCESSING

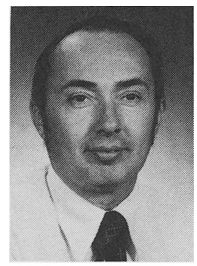
SCRUBBER UNIT FOR TRITIUM REMOVAL

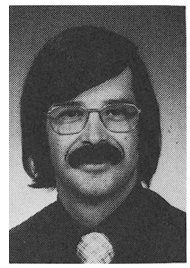
F. A. Koehler, Jr.
B. D. Craft
J. Ashe
H. A. Woltermann

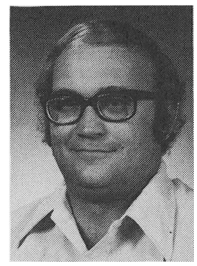
Francis A. Koehler, Jr. (top left) (BChE, University of Dayton, 1971) is a member of the Engineering Group in the Nuclear Operations Department at Mound Laboratory. He was responsible for the engineering design of the tritium scrubber system. Bartlett D. Craft (top right) (BS, chemistry, St. Lawrence University, 1958) was group leader for the Tritium Analysis Group when the System was designed and built. His present position at Mound Laboratory is group leader in the Plutonium Analysis Group. John Ashe (bottom left), employed by Mound Laboratory as a technician in the Nuclear Analytical Section for the past five years, is presently principal operator of the scrubber system. H. Anthony Woltermann (bottom right) (PhD, inorganic chemistry, University of Cincinnati, 1972) has been a member of the Analytical Chemistry Section at Mound Laboratory since 1965, and is presently group leader of the Tritium Analysis Group.

THE CRITICALITY OF PERIODICALLY BORON-POISONED ENRICHED URANIUM SOLUTION SYSTEMS

Robert E. Rothe
Donald L. Alvarez
Harold E. Clark





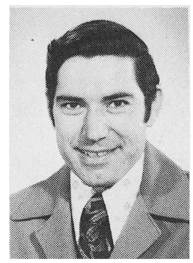


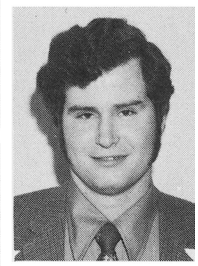
Robert E. Rothe (top) (PhD, University of Wisconsin) joined the Nuclear Safety Group at Dow Chemical U.S.A.'s Rocky Flats (Colorado) Plant in 1964. His interests since then have included experimental and theoretical determinations of criticality and their applications to nuclear safety. Donald L. Alvarez (center) (MS, physics, Central Missouri State University) is a senior nuclear safety engineer with the Nuclear Safety Group at Dow Chemical U.S.A.'s Rocky Flats Plant. He joined Dow Chemical U.S.A. in 1971. Harold E. Clark (bottom) (MS, physics, Colorado School of Mines) is a senior research physicist. He worked eight years with the Critical Mass Laboratory of Dow Chemical U.S.A.'s Rocky Flats Division performing experiments which involved uranium metal and solution. He is currently working with the Materials Technology Coatings Research and Development Group at Dow.

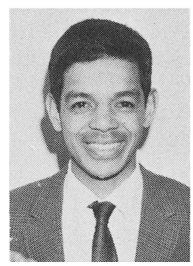
FUELS

KERNEL MIGRATION IN COATED CARBIDE FUEL PARTICLES

O. M. Stansfield
C. B. Scott
J. Chin





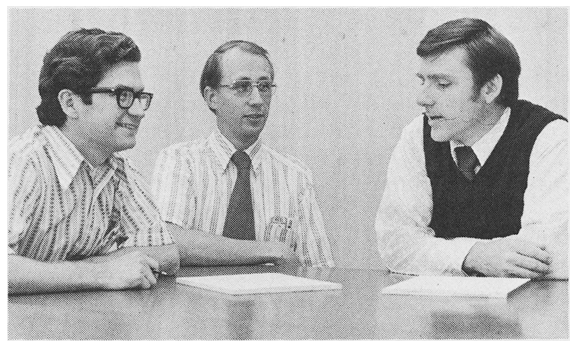


O. M. Stansfield (top) (MS, University of California) is manager of the HTGR Fuel Materials Branch. Since 1966 he has been involved in various aspects of coated-particle and refractory-control materials work at the General Atomic Company. C. B. Scott (center) (MS, University of Washington, 1971) is a senior engineer in the HTGR Fuel Materials Branch. His principal areas of research are thermal performance and irradiation testing of HTGR fuels. Jack Chin (bottom) (MS, University of California at Los Angeles) has been involved in the development of pyrocarbon coatings, nuclear fuel particles, and the testing of HTGR fuel concepts since joining the General Atomic Company in 1962. During this period, he also participated in the development of ceramic-to-metal seals, trilayer insulators, and tungsten emitters for a thermionic development program sponsored by the U.S. Atomic Energy Commission.

MATERIALS

CORRELATION OF TRANSIENT-TEST DATA WITH CONVENTIONAL MECHANICAL PROPERTIES DATA

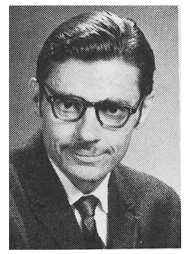
J. L. Straalsund
R. L. Fish
G. D. Johnson

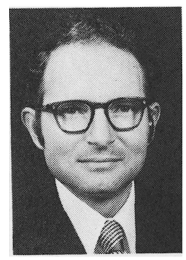


Jerry Straalsund (right) (PhD, engineering science, Washington State University), manager of the Irradiation Creep Section of Westinghouse Hanford Company, is currently working on the creep of fast-reactor structural materials. Robert Fish (left) (MS, materials science, Oregon State University) is an engineer in the Mechanical Properties Section of Westinghouse Hanford Company. His principal area of research is analysis of the postirradiation mechanical properties of reactor core materials. Gerald Johnson (center) (MS, metallurgical engineering, Washington State University), a senior engineer in the Mechanical Properties Section of Westinghouse Hanford Company, is currently investigating the behavior of prototypic fast-reactor cladding under simulated reactor transients.

A NEW, LOW-TEMPERATURE SYNTHESIS OF PLUTONIUM AND URANIUM NITRIDES

J. M. Cleveland
G. H. Bryan
C. R. Heiple
R. J. Sironen





J. M. Cleveland (top left) (PhD, chemistry, University of Colorado, 1959) has been active in actinide chemical research and development for 20 years. His activities have included analytical methods development, process development, fuel synthesis and fabrication, solvent extraction, molten-salt studies, and chemical investigations in nonaqueous solvents, from which the present paper is an outgrowth, and he is the author of *The Chemistry of Plutonium* (1970). He is currently involved in studies of plutonium in the environment. G. H. Bryan (top right) (BS, chemistry, San Jose State College) is presently completing his thesis for an MS in chemistry from the Colorado School of Mines. His research work for the past several years has been in the field of nonaqueous plutonium chemistry. He is currently employed at Battelle-Northwest Laboratories as a research scientist. C. R. Heiple (bottom left) (PhD, metallurgical engineering, University of Illinois, 1967) is a research specialist with Dow Chemical U.S.A., Rocky Flats Division. His research interests include liquid-metal embrittlement, mechanical metallurgy of beryllium, and actinide nitride synthesis. R. J. Sironen (bottom right) (MS, chemistry, Michigan Technological University) has been involved with the chemistry of actinides, particularly the analytical chemistry of plutonium. He was employed at Argonne National Laboratory, Vallecitos Nuclear Center of General Electric, and Lawrence Livermore Laboratory, before joining the Plutonium Analytical Services Laboratory of Dow Rocky Flats Division in 1970.

THE EFFECT OF CHEMISTRY VARIATIONS ON THE RECRYSTALLIZATION TEMPERATURE OF 20% COLD-WORKED TYPE 316 STAINLESS STEEL

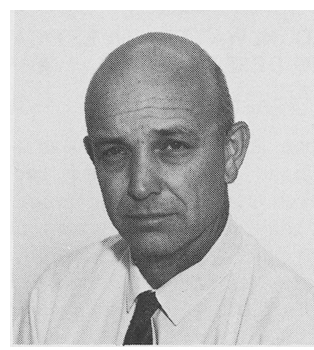
Michael M. Paxton
Jerry L. Straalsund

Michael Paxton (left) (MS, metallurgy, University of Washington) is a research engineer at Westinghouse Hanford Company, his principal area of responsibility being the mechanical properties of advanced alloys. Jerry Straalsund (PhD, engineering science, Washington State University) is manager of Irradiation Creep at Westinghouse Hanford Company.

INSTRUMENTS

MONITORING FISSION GAS IN EBR-II BY HIGH-RESOLUTION GAMMA SPECTROMETRY

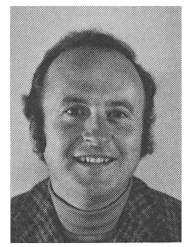
G. S. Brunson

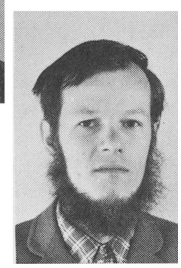


G. S. Brunson (MS, Princeton) has been with Argonne National Laboratory at the National Reactor Testing Station since 1954 with the exception of a year in Lisbon, where he served as an IAEA technical assistance expert, and two years in Vienna (at IAEA Headquarters). Other interests are delayed neutrons, neutron chain kinetics, and the promotion of nuclear programs in developing countries.

INVESTIGATION OF THE FLUORINE-17 ACTIVITY AS A NUCLEAR POWER MONITOR IN THE HEAVY WATER MODERATED REACTOR DIORIT

K. Behringer
B. Leoni
H. S. Pruys

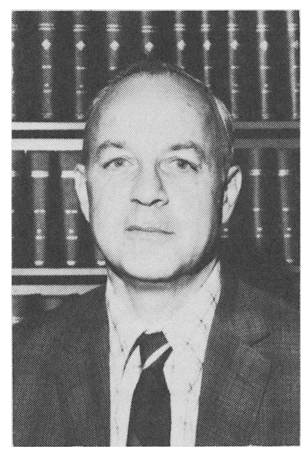




Klaus Behringer (top) (PhD, nuclear physics) is involved in development work in the field of nuclear radiation measuring techniques. Since 1959, he has been with the Federal Institute for Reactor Research (EIR) at Würenlingen, Switzerland. Currently, he is working on reactor noise analysis. Bruno Leoni (center) is a member of the technical staff of the Physics Division. He joined EIR in 1967, where he has been engaged in developing nuclear instrumentation and fission counters. Currently, he is working on reactor noise analysis. Hendrik S. Pruys (bottom) (MS, physics, University of Utrecht, 1969) has been a member of the Physics Division of EIR since 1969, where he has been engaged in developing nuclear instrumentation and measuring techniques. He is now working with the Nuclear Chemistry Group of EIR on mass and charge distributions in nuclear fission.

ANALYSIS OF RADIOACTIVE WASTE SUPERNATE BY LASER-RAMAN SPECTROMETRY

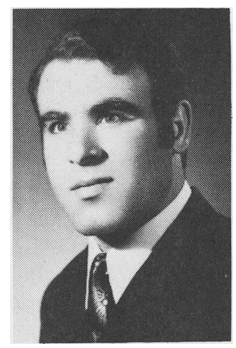
A. L. Marston



Alfred L. Marston (AB, Colgate University, 1940; PhD, physical chemistry, The Johns Hopkins University, 1943) headed the Instrumental Analysis Group at Savannah River Laboratory (SRL) from its inception to 1967). After a year of post-doctoral research at the University of South Carolina, he returned to SRL where he has been applying vibrational spectroscopic techniques to the characterization and analysis of products from nuclear separations processes.

GROUNDWATER INVESTIGATION IN THE IRAQI WESTERN DESERT (AL-MAT AREA) USING NUCLEAR TECHNIQUE

Abbas S. Al-Badri



Abbas Salih Musa Al-Badri (BSc, geology, University of Baghdad, 1967), former geologist with the Nuclear Research Institute of the Iraqi Atomic Energy Commission, Baghdad, is currently assistant researcher and head of the Hydrogeological Division in the Nuclear Geology Department, Nuclear Research Institute. His present interests lie in the application of nuclear techniques to hydrological studies.