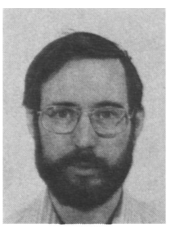
nuclear technology®

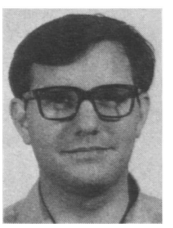
# AUTHORS — NOVEMBER 1976

## REACTORS

### MAXIMUM NEUTRON WALL LOADINGS IN BEAM-DRIVEN TOKAMAK REACTORS

*D. L. Jassby*
*H. H. Towner*

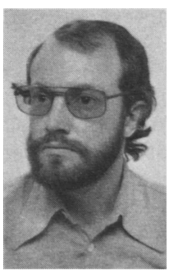




Daniel L. Jassby (top) (PhD, plasma physics, Princeton University, 1970) is presently a member of the Experimental Division of the Princeton Plasma Physics Laboratory, doing research in tokamak plasmas and tokamak fusion reactors. Harry H. Towner (MS, nuclear engineering, University of Illinois at Urbana, 1975) is currently pursuing studies of beam-driven fusion reactors at the Princeton Plasma Physics Laboratory.

### RESEARCH ON A 2700-MW(th) PEBBLE-BED REACTOR FOR A HELIUM-TURBINE POWER PLANT

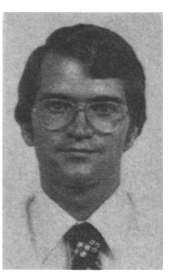
*H. Jochem Rütten*
*Eberhard Teuchert*



H. J. Rütten (top) (PhD, engineering science, Technische Hochschule Aachen, 1976) joined Kernforschungsanlage Jülich in 1972. He is working on the high-temperature reactor (HTR) core design and fuel cycle, especially for the OTTO reactor. His current interests are burnup physics and the design of HTRs in a high-converting fuel cycle. E. Teuchert (PhD, theoretical physics, University of Cologne) has been employed by the Kernforschungsanlage Jülich since 1964. His current interests are computer code system development and analysis of HTRs and HTR fuel cycles, preferably of the pebble-bed reactor.

### TRITIUM DIFFUSION IN FUSION REACTOR BLANKETS

*J. M. Mintz*
*T. S. Elleman*
*K. Verghese*



J. Mark Mintz (top) (BS, physics, University of North Carolina at Chapel Hill, 1972; MS, nuclear engineering, North Carolina State University, 1974) is a senior design engineer in the Experimental Power Reactor (EPR) Group, Fusion Division, General Atomic Company, and has been responsible for the conceptual design of tritium handling and vacuum systems for the EPR since joining the company in 1974. Thomas S. Elleman (center) (PhD, physical chemistry, Iowa State University) has been associated with the Nuclear Engineering Department at North Carolina State University for 12 years as associate professor, professor, and currently as head of the department. His current research interests are in reactor chemistry, diffusion phenomena, and fusion reactor blanket effects. Kuruvilla Verghese (bottom) (PhD, nuclear engineering, Iowa State University, 1963) is a professor in the Nuclear Engineering Department at North Carolina State University. His current research interests are in atomic diffusion, radioisotope applications, and nuclear fuel cycles.

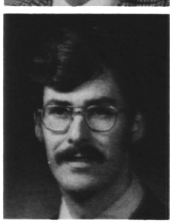
## FABRICATION, PROPERTIES, AND IRRADIATION BEHAVIOR OF U/Pu PARTICLE FUEL FOR LIGHT WATER REACTORS

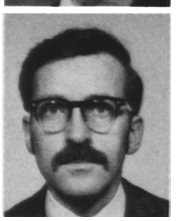
*Helfrid W. H. Lahr*

Helfrid W. H. Lahr (PhD, chemistry, Technical University of Braunschweig, 1968) is employed at Gelsenberg AG and has been a leader of the group for fuel development since 1972. Before that time he was leader of the group for vitrification of highly active waste solutions. His interests include the whole nuclear fuel cycle, and he is also working in the management of reprocessing waste.

## CRUSHING STRENGTH OF HIGH-TEMPERATURE GAS-COOLED REACTOR FUEL PARTICLES

*W. J. Lackey*
*D. P. Stinton*
*L. E. Davis*
*R. L. Beatty*



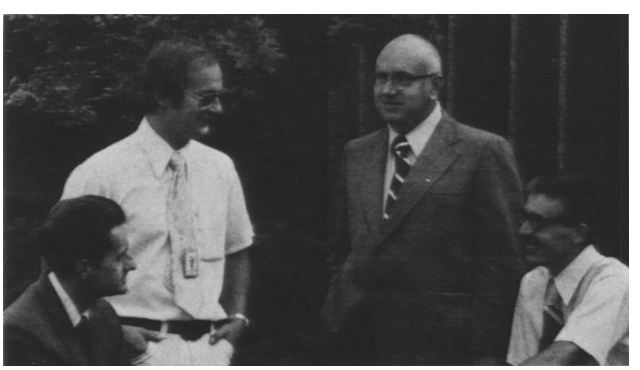


W. J. Lackey (top) (BS, metallurgical engineering, 1961; PhD, ceramic engineering, 1969) is lead development engineer in the Metals and Ceramics Division at Oak Ridge National Laboratory (ORNL). He is involved in the fabrication and evaluation of nuclear fuels. David P. Stinton (center) (MS, ceramic engineering, Virginia Polytechnic Institute) has been in the Metals and Ceramics Division at ORNL since 1974. He is involved in the process development and characterization of carbon and silicon carbide coatings for high-temperature gas-cooled reactor (HTGR) fuel. L. E. Davis (not pictured) is a co-op student from the University of Cincinnati. R. L. Beatty (bottom) (BS, Pennsylvania State University, 1961; MS, University of Tennessee, 1966; PhD, University of Washington, 1974) has developed laboratory-scale equipment and processes for HTGR fuel kernel and coating fabrication, conducted research on pyrocarbon characterization, and been extensively involved with irradiation testing and evaluation. He is presently on assignment to EIR, Switzerland, for advanced breeder fuels research.



## INCENTIVES FOR PARTITIONING HIGH-LEVEL WASTE

*H. C. Burkholder*
*M. O. Cloninger*
*D. A. Baker*
*G. Jansen*



H. C. Burkholder (right) (PhD, chemical engineering, University of Washington) is an engineer in the Chemical Technology Department, Battelle-Northwest, and a part-time instructor at the Joint Center for Graduate Study, Richland, Washington. His current interests include mathematical modeling, radioactive waste management, and phenomena associated with fluid interfaces. M. O. Cloninger (second from left) (BS, chemical engineering, Montana State University) is employed by Battelle-Northwest and is a part-time graduate student at the Joint Center for Graduate Study. Since joining Battelle in 1974, he has been involved in modeling studies for various aspects of geothermal and nuclear power. D. A. Baker (left) (MS, physics, University of Colorado) is a scientist in the Physics and Instrumentation Department of Battelle-Northwest. Since joining Battelle in 1972, he has evaluated the consequences of radioactivity releases from commercial

power reactors and other nuclear facilities. Prior to that time he performed accident analyses at the Hanford N Reactor Project. G. Jansen (second from right) (PhD, chemical engineering, Massachusetts Institute of Technology) has been involved in heat transfer design and the development of safety analysis techniques for the interim storage and ultimate disposal of radioactive wastes. He is currently employed by the Centrifuge Enrichment Department, Exxon Nuclear Company, and indulges in amateur viticulture and enology.

## MATERIALS

### HYDROGEN AND OXYGEN BEHAVIOR IN LIQUID SODIUM (EXPERIMENTAL)

*Hiroji Katsuta*
*Kazuo Furukawa*

Hiroji Katsuta (top) (PhD, engineering of metallic materials, Tohoku University, 1969) is a research scientist at the Molten Materials Laboratory of the Japan Atomic Energy Research Institute (JAERI). His interests are in nonmetallic impurity behaviors in liquid metals and molten salts, effect of impurities on compatibility, and hydrogen (tritium) permeation through metal-membranes contacting with molten materials. Kazuo Furukawa (Dr. Sci., chemistry, Kyoto University, 1960) is chief of the Molten Materials Laboratory of JAERI. His interests are in molten material science and technology, such as inorganic liquid structure chemistry, sodium technology, molten salt reactor technology, and fusion reactor blanket chemistry.

### EFFECT OF NEUTRON IRRADIATION ON THE MICROSTRUCTURE AND PROPERTIES OF TITANIUM-STABILIZED TYPE 316 STAINLESS STEELS

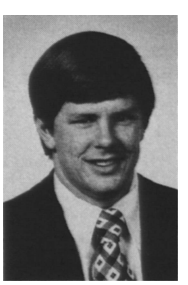
*E. E. Bloom*
*J. M. Leitnaker*
*J. O. Stiegler*

E. E. Bloom (right) (PhD, University of Tennessee, 1970), J. M. Leitnaker (left) (PhD, University of Kansas, 1960), and J. O. Stiegler (center) (PhD, University of Tennessee, 1971) are members of the Radiation Effects and Microstructural Analysis Group of the Metals and Ceramics Division of Oak Ridge National Laboratory, with Stiegler serving as group leader.

## SHIELDING

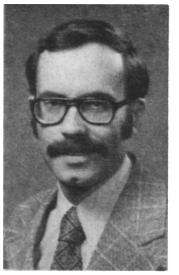
### SHIELDING CALCULATION TECHNIQUES FOR THE DESIGN OF PLUTONIUM PROCESSING FACILITIES

*T. C. Gillett*
*R. S. Denning*
*J. L. Ridihalgh*



Thomas C. Gillett (top) (BS, Stanford University, 1969; MS, University of Colorado, 1970) is head of the Shield Design Group of the Power Division of C. F. Braun and Co. For the past $2\frac{1}{2}$ years, his interests have been related to all aspects of radiation protection in a boiling water reactor power plant. His other experience includes plutonium recovery shielding, wastewater treatment, and heat exchanger

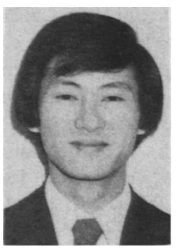
design. Richard S. Denning (left) (PhD, nuclear engineering, University of Florida, 1967) is associate manager of the Nuclear and Flow Systems Section of Battelle Columbus Laboratories, where he is involved in research in nuclear analysis and reactor safety. John L. Ridihalgh (right) (PhD, nuclear engineering, Iowa State University, 1968), president of Ridihalgh and Associates, Inc., is a consultant in the areas of shielding, criticality, handling, and transportation of nuclear materials. He worked as research engineer in these fields at Battelle's Columbus Laboratories for eight years. He left Battelle in 1974 to form Ridihalgh and Associates, Inc.



## INSTRUMENTS

### NEUTRON RADIOGRAPHY OF FAST TRANSIENT PROCESSES

*G. S. Okawara*
*A. A. Harms*



Gordon Okawara (top) (B.Eng., engineering physics, McMaster University, 1975) is a M.Eng. candidate at the same institution. In addition to his nuclear engineering interests, he is an accomplished musician who has earned a music degree in his spare time (ARCT, University of Toronto, 1974). A. A. Harms (PhD, University of Washington, 1969) is associate professor of engineering physics at McMaster University, with interests in neutron radiography, neutron transport theory, and fusion-fission systems analysis.

## TECHNIQUES

### REACTOR FLUX MEASUREMENTS USING THERMOLUMINESCENT DOSIMETRY

*John W. McKlveen*
*Michael Schwenk*

John W. McKlveen (top) (BS, U.S. Naval Academy, 1965; ME, nuclear engineering, 1971; PhD, nuclear engineering, University of Virginia, 1974) is a faculty member, radiation safety officer, and is responsible for Radiation Research Laboratories at Arizona State University. His previous work included service in the Naval nuclear-powered submarine program and thesis research in the area of liquid scintillation alpha-particle detection. His present research interests include liquid scintillation, environmental dosimetry, and fast-neutron activation analysis. Michael Schwenk (BS, engineering, Arizona State University, 1975) researched and ran tests of thermoluminescent dosimetry in-core measurement systems from June 1974 until August 1975. He is currently assigned to the U.S. Army's Ballistic Research Laboratory in Aberdeen, Maryland.

## DESIGN AND PERFORMANCE OF A MICROWAVE STRAIN MEASURING SYSTEM FOR MATERIALS TESTS

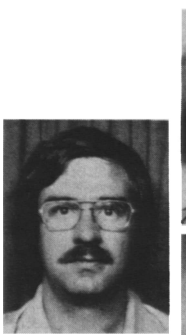
*T. Roger Billeter*
*L. D. Blackburn*

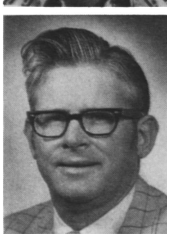
T. Roger Billeter (left) (MSEE, University of Washington, 1961) has been engaged during the past ten years in the development of instrumentation for nuclear reactors. His current efforts concern application of techniques at microwave frequencies for the measurement of mechanical properties of materials. L. D. Blackburn (ScD, Massachusetts Institute of Technology, 1963) has over ten years of experience in the development and evaluation of materials for elevated temperature service, with special emphasis on the deformation behavior of austenitic stainless steels related to design and performance of liquid-metal fast breeder reactor systems. His current interests and activities center on the evaluation of neutron irradiation on the mechanical properties of reactor materials.

# MATERIALS

## OBSERVATIONS ON THE LUMINESCENCE OF $\alpha$-$Al_2O_3$ (SYNTHETIC SAPPHIRE) IN A REACTOR ENVIRONMENT

*R. N. Davie, Jr.*
*J. F. Davis III*
*R. T. Schneider*



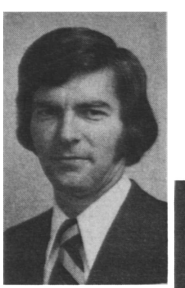


Robert N. Davie (top) (PhD, nuclear engineering, University of Florida, 1975) is a Captain in the U.S. Air Force and is connected with the research and development effort of the Air Force. John F. Davis (center) (PhD candidate, the University of Florida) is interested in the kinetics of excitation of gases by fission fragments. Richard T. Schneider (bottom) (PhD, physics, University of Stuttgart, Germany, 1961) is a professor of nuclear engineering at the University of Florida. His interests include nuclear-pumped lasers, excitation of gases by fission fragments, and plasma spectroscopy.

# TECHNIQUES

## DIRECT MEASUREMENT OF CESIUM ADSORPTION ON HIGH-TEMPERATURE SURFACES USING RADIOACTIVE TRACERS

*R. K. Collier*
*C. E. Backus*



R. Kirk Collier (top) (PhD, mechanical engineering, Arizona State University, 1975) is an assistant professor of mechanical engineering at the University of Maryland at College Park. His research at Arizona State University (ASU) has been in both the thermoelectric and thermionic conversion areas. Charles E. Backus (BSME, Ohio University, 1959; PhD, nuclear engineering, University of Arizona, 1965) is a professor of engineering at ASU at Tempe. He has 13 years of experience in advanced energy conversion systems, with emphasis in the thermionic and photovoltaic areas.