



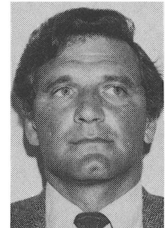
## AUTHORS — MARCH 1978

### REACTORS

#### RESOURCE UTILIZATION OF SYMBIOTIC HIGH-TEMPERATURE GAS-COOLED REACTOR SYSTEMS

Giancarlo M. Borgonovi (top) (PhD, physics, University of Milano, Italy, 1961) was with General Atomic for 11 years, where he worked on neutron thermalization and fuel management for high-temperature gas-cooled reactors (HTGRs). He is presently with Science Applications, Inc., where he is involved with nuclear safeguards and systems simulation. Rudolf H. Brogli (PhD, physics, University of Berne, 1964), after working in reactor physics for heavy water reactors and HTGRs, is now active in fuel management for General Atomic. His current interests include economic and resource evaluations of conceptual reactor designs, reactor systems, and energy centers.

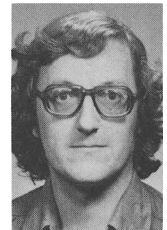
*G. M. Borgonovi  
R. H. Brogli*



#### EFFECTS OF A PIPE RUPTURE ACCIDENT ON THE REACTOR INTERNALS IN A BOILING WATER REACTOR DEMONSTRATED BY THE EXAMPLE OF PHILIPPSBURG 1

Claus Elter (top) (Dipl. Ing., mechanical engineering, University of Karlsruhe, 1962; Dr. Ing., nuclear technology, University of Aachen, Germany, 1973), head of the Reactor Internals Department at Hochttemperatur-Reaktorbau GmbH, Germany, was formerly an expert on the design and calculation of primary circuit components with TUEV Baden, Germany. He has special experience in the application of finite element methods to static and dynamic structural mechanics problems. Eberhard Haug (center) (Dipl. Ing., structural engineering, University of Stuttgart, 1964; PhD, structural engineering and structural mechanics, University of California, Berkeley) is head of the Research and Development Department at Engineering System International, Rungis-Silic, France. He works in the areas of large strain/large deformation static and dynamic structural analysis with material and geometric nonlinearities. Helmut Morassi (bottom) (Dipl. Ing., structural engineering, University of Stuttgart, 1964) is an independent consulting engineer from Stuttgart, Germany. He specializes in the application of finite element methods to structural mechanics problems. Since 1975, he has been in association with Engineering System International.

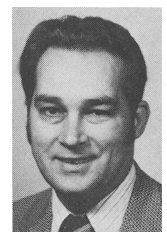
*Claus Elter  
Eberhard Haug  
Helmut Morassi*



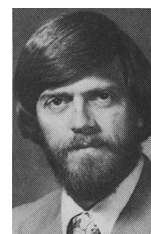
#### NEUTRON MULTIPLICATION FACTORS AS A FUNCTION OF TEMPERATURE: A COMPARISON OF CALCULATED AND MEASURED VALUES FOR LATTICES USING <sup>233</sup>UO<sub>2</sub>-ThO<sub>2</sub> FUEL IN GRAPHITE

Darrell F. Newman (right) (BS, nuclear engineering, Kansas State University, 1963; MS, nuclear engineering, University of Washington, 1970) is a senior research engineer in nuclear systems analysis at Battelle Pacific Northwest Laboratories

*Darrell F. Newman  
Bryan F. Gore*



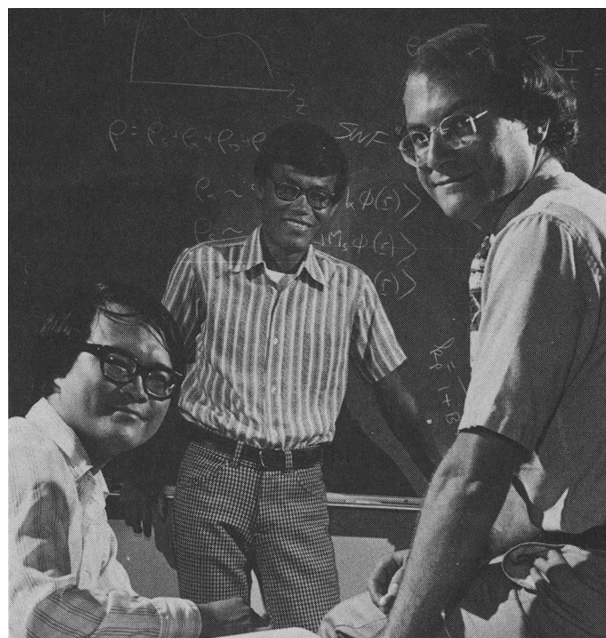
(PNL). He has worked in the area of nuclear fuel cycle analysis and reactor physics for the past 12 years, conducting and directing both experimental and calculational studies. His current interest is in alternate fuel cycle systems studies. Bryan F. Gore (B, engineering physics, Cornell University, 1961; MS, PhD, physics, University of Michigan, 1964, 1967) is a senior research scientist in the Energy Systems Department at PNL. Since joining PNL in 1972, he has worked in the fields of neutronics analyses of fission, fusion, and hybrid systems, and of environmental analyses of fusion energy systems. He is presently involved in nuclear criticality analyses.



### BOILING WATER REACTOR SCRAM REACTIVITY CHARACTERISTICS

Hsiang-Shou (Sam) Cheng (center) (BS, electrical engineering, National Taiwan University, 1960; MS, nuclear engineering, National Tsinghua University, 1963; PhD, nuclear engineering, Massachusetts Institute of Technology, 1968), David J. Diamond (right) (BS, engineering physics, Cornell University, 1962; MS, nuclear engineering, University of Arizona, 1963; PhD, nuclear engineering, Massachusetts Institute of Technology, 1968), and Ming-Shih Lu (BS, physics, National Taiwan University, 1969; MS and PhD, engineering and applied physics, Cornell University, 1972 and 1975) are all members of the Reactor Core Safety Analysis Group at Brookhaven National Laboratory, of which D. J. Diamond is the group leader. Their interests lie in the areas of reactor physics and thermal-hydraulics and the application of these disciplines to core safety problems. They have been involved in the development of physics and engineering models and numerical methods used in safety analysis codes. In addition, they have conducted analyses of a wide range of light water reactor safety and core performance problems.

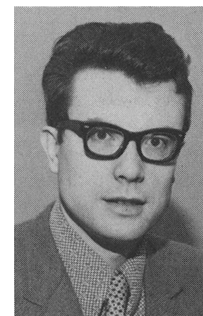
*Hsiang-Shou Cheng  
David J. Diamond  
Ming-Shih Lu*



### CORE EXIT INSTRUMENTATION OF THE CLINCH RIVER BREEDER REACTOR PLANT

Mario D. Carelli (PhD, nuclear engineering, University of Pisa, Italy, 1966) is a fellow engineer at Westinghouse Advanced Reactors Division, where he is responsible for the thermal-hydraulic design and development of liquid-metal fast breeder reactor cores, and has been involved in the design of the Clinch River Breeder Reactor (CRBR) since its inception. His paper highlights the results of a study conducted by a task force which he headed in 1975-1976 to define the CRBR instrumentation. He is also part-time professor at the University of Pittsburgh, where he teaches courses in nuclear engineering. Prior to joining Westinghouse in 1969, he worked at the Italian Comitato Nazionale per l'Energia Nucleare in the Fast Breeder Reactor Program.

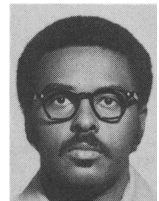
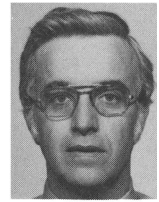
*Mario D. Carelli*



## NEUTRONICS AND PHOTONICS CALCULATIONS FOR THE TOKAMAK EXPERIMENTAL POWER REACTOR

R. T. Santoro (top) (MS, physics, University of Tennessee, 1967) is a research staff member in the Neutron Physics Division at Oak Ridge National Laboratory (ORNL). His work has been in the areas of medium-energy neutron and proton spectroscopy, high-energy radiation shielding for accelerators and manned space vehicles, and cancer radiotherapy studies. His current interests focus on magnetic fusion energy reactor design, particularly on neutronics problems. V. C. Baker (center) (MS, nuclear engineering, University of Tennessee, 1976) is a member of the Computer Sciences Division at ORNL. He was previously employed by Ebasco Services, Inc., where he participated in the neutronics analyses of the Tokamak Fusion Test Reactor. His current interests include radiation transport methods, cross-section data processing, and computer code development. At the time this work was performed, he was a graduate research assistant at the University of Tennessee. J. M. Barnes (bottom) (BS, mathematics, University of Arkansas, 1965) is a member of the Computer Sciences Division at ORNL. His current interests focus on magnetic fusion energy reactor design, particularly on neutronics problems.

*R. T. Santoro  
V. C. Baker  
J. M. Barnes*

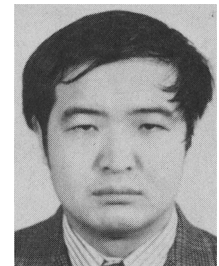


## FUEL CYCLES

### A HIERARCHY LEVEL SCHEME FOR QUASI-OPTIMUM FUEL ASSEMBLY LOADING IN BOILING WATER REACTORS

Koichi Sekimizu (Master of Technology, nuclear engineering, Tokyo Institute of Technology, 1971) has worked at the Nippon Atomic Industry Group Nuclear Research Laboratory since 1971 in fuel management optimization and in the development of the reactor core management system.

*Koichi Sekimizu*

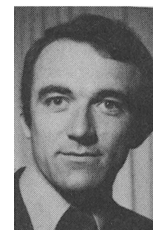


## CHEMICAL PROCESSING

### QUELQUES CARACTERISTIQUES DE L'AIR D'UNE MINE D'URANIUM

André Renoux (top right) (Dr, 3<sup>e</sup> cycle, geophysics, Paris, 1961; Dr ès Sciences, physics, Paris, 1965), a former assistant of P. Bricard in Paris, has been director of the Laboratory of Aerosol Physics and Atmospheric Radioactivity at the Faculty of Sciences of Brest since 1969. His laboratory works on granulometric studies of aerosols, atmospheric radioactivity, atmospheric electricity, air pollution, the atmosphere of uranium mines, and on theoretical studies in aerosol physics. Jean Yves Barzic (top left) (Dr, 3<sup>e</sup> cycle, physical metrology, Brest, 1975) works with Dr. Renoux at Brest. Under the auspices of the Commissariat à l'Énergie Atomique at Limoges-La-Crouzille, he conducted a study of the atmosphere of uranium mines. Guy J. Madelaine (bottom right) (Engineer CNAM, Paris, 1962; Dr ès Sciences, Paris, 1968) is head of the Laboratory of Atmospheric Physics at the Centre d'Études Nucleaires (CEN) in Fontenay-aux-Roses and has worked in the area of aerosol physics for more than 15 years. Pierre Zettwoog (bottom left) (Engineer, Ecole Polytechnique, 1957) has been the head of the Section Technique d'Études de la Pollution Atmosphérique et des Mines (STEPAM) at CEN for many years.

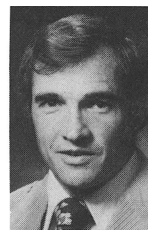
*André Renoux  
Jean Yves Barzic  
Guy J. Madelaine  
Pierre Zettwoog*



**A RADIOLOGICAL ASSESSMENT OF REPROCESSING  
ADVANCED LIQUID-METAL FAST BREEDER REACTOR  
FUELS**

John E. Till (top right) (MS, health physics, Colorado State University; PhD, nuclear engineering, Georgia Institute of Technology, 1976) was a graduate of the U.S. Naval Academy and an officer in the Naval Submarine Force before leaving the service for graduate education. Since 1974, he has worked in the Analysis and Assessments Section at the Oak Ridge National Laboratory (ORNL). His primary area of interest is the analysis of critical radionuclides released to the environment by nuclear facilities. E. Sloan Bomar (top left) (BS, metallurgical engineering, University of Cincinnati, 1949) is a staff member at ORNL and is currently involved in the environmental assessment of fast breeder fuels recycle. His previous experience includes the synthesis and fabrication of advanced fuels for liquid-metal fast breeder reactors. Leon E. Morse (bottom right) (BS, chemistry, Brooklyn College, 1936) is a staff member in the Chemical Technology Division at ORNL. His principal field of interest has been in aspects of aqueous chemical processing related to nuclear fuel cycles. V. J. Tennery (bottom left) (PhD, ceramic engineering, University of Illinois, 1959) is currently group leader of ceramic technology in the Metals and Ceramics Division at ORNL. He has been working in the area of nuclear fuel and neutron absorber materials for the past eight years. Most recently, this nuclear fuel work has included characterization methods for pyrocarbon and silicon carbide coatings on high-temperature gas-cooled reactor (HTGR) fuel particles and process development for weak acid resin-based HTGR fuel particles.

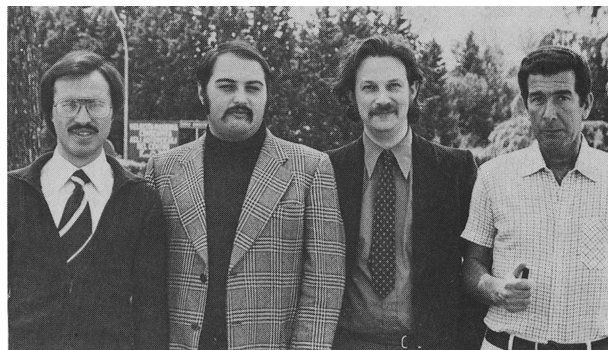
*J. E. Till  
E. S. Bomar  
L. E. Morse  
V. J. Tennery*



**ELIMINATION OF TRANSURANIUM ELEMENTS BY  
BURNUP IN A POWER FAST BREEDER REACTOR**

G. Oliva (far left) (PhD, nuclear physics, Rome University, 1976) has a fellowship at Comitato Nazionale per l'Energia Nucleare (CNEN) at Casaccia. His activity is in the field of long-lived radioactive waste disposal, with particular interest on the neutron physical feasibility studies of the neutron transmutation of transuranium (TRU) radioactive wastes. G. Palmiotti (center left) (PhD, nuclear physics, Rome University, 1973) is a staff member of the NIRA nuclear industry for advanced reactors. He is at present associated with CNEN as a consultant, in the framework of the common activities on fast breeders, in particular the shielding and core calculational methods assessment for the Superphenix Project. M. Salvatores (center right) (PhD, nuclear physics, Turin University, 1963) is senior scientist at the Reactor Theory Laboratory of CNEN Casaccia. He has been involved in the coordination of the research work on several neutronics aspects of core and shielding design in the framework of the common French-Italian activities in support of the commercial liquid-metal fast breeder reactor Superphenix. L. Tondinelli (far right) (reactor engineer, Rome University, 1960) is senior scientist at the Reactor Theory Laboratory of CNEN Casaccia. His work is in the field of neutronics aspects of core design and burnup calculations of light water reactors. At present, he is working on the neutron physical feasibility studies of the neutron transmutation of TRU radioactive wastes.

*G. Oliva  
G. Palmiotti  
M. Salvatores  
L. Tondinelli*



**DIFFUSION OF PLUTONIUM IN HIGH-TEMPERATURE ISOTROPIC PYROLYTIC CARBON**

N. L. Baldwin (top) (BS, chemistry, San Diego State University, 1962) is currently a staff member in the High-Temperature Gas-Cooled Reactor (HTGR) Project of General Atomic Company. His current areas of study include the in-pile transport and release of fission products from HTGR fuels. P. W. Winchell (center) (BS, chemistry, University of Arizona, 1950) is presently on the staff of Spin Physics, Inc. His interests include the application of high-temperature materials, mass spectrometry, and diffusion system. S. Langer (bottom) (AB, chemistry, New York University, 1949; PhD, chemistry, Illinois Institute of Technology, 1955) is associated with the Gas-Cooled Fast Reactor Project of General Atomic Company. He is responsible for its fuels and materials development, including fission product release and migration in the helium coolant.

*N. L. Baldwin*  
*P. Winchell*  
*S. Langer*

