

AUTHORS – AUGUST 1980

REACTORS

QUALITY INFLUENCE ON THE DEPARTURE FROM NUCLEATE BOILING IN CROSS FLOWS THROUGH BUNDLES

M. Cumo (top right) (degree, nuclear engineering, Politecnico di Milano, 1962) is a full professor of nuclear power plants at the University of Rome and consultant to the Comitato Nazionale per l'Energia Nucleare. He is presently director of the Laboratorio di Impianti Nucleari, Rome University. **G. E. Farello** (top left) (degree, mechanical engineering, Rome University, 1953) is director of the Heat Transfer Laboratory of the Comitato Nazionale per l'Energia Nucleare and assistant to the director of the Energy Program, Consiglio Nazionale delle Ricerche. **Jerzy Andrzej Gasiorowski** (center right) (PhD, Warsaw Technical University, Poland, 1970) is head of the laboratory investigating boiling heat transfer at the Institute of Heat Engineering at Warsaw Technical University. He is currently working on liquid sodium boiling heat transfer in a strong magnetic field. **G. Iovino** (bottom left) (degree, nuclear engineering, Rome University, 1978) has performed thesis research in cross flow boiling. **A. Naviglio** (bottom right) (degree, nuclear engineering, Rome University, 1973) is an assistant in nuclear engineering at Rome University and a researcher for the Electricity Board of Italy.

M. Cumo
G. E. Farello
J. Gasiorowski
G. Iovino
A. Naviglio



THERMOMECHANICAL DYNAMIC BEHAVIOR OF THE SOLID WALL OF A PELLET FUSION REACTOR

Kenzo Miya (top) (PhD, University of Tokyo, 1969) spent two and one-half years at Products Research and Development Laboratory, Nippon Steel Corporation. He has been an associate professor at the Nuclear Engineering Research Laboratory of the University of Tokyo since 1972. He was a visiting associate professor at the University of Maryland's Institute for Physical Science and Technology during 1978. His primary research interests include electromagnetomechanical interaction problems and radiation-induced mechanical vibration related to fusion reactor technology. **Joseph Silverman** (PhD, Columbia University, 1951) has been a professor of chemical and nuclear engineering at the University of Maryland since 1960. He has also served as director of the university's Institute for Physical Science and Technology since 1976. He has been chairman of the American Nuclear Society Isotopes and Radiation Division and received the society's Radiation Industry Award in 1975. He was a Guggenheim Fellow in 1966. His primary research interest is the effect of ionizing radiation on chemical systems and materials.

Kenzo Miya
Joseph Silverman



REDUCED SCALE SIMULATIONS OF BOILING WATER REACTOR POOL SWELL: SOME LIMITATIONS TO THE SCALING LAWS

William G. Anderson (top right) [SM, mechanical engineering, Massachusetts Institute of Technology (MIT), 1977] is a student in the Mechanical Engineering Department of MIT. **Richard P. Burke** (top left) is a student in the MIT Nuclear Engineering Department. **Peter W. Huber** (bottom right) (PhD, mechanical engineering, MIT, 1976) is an assistant professor, and **Ain A. Sonin** (bottom left) (PhD, aerophysics, University of Toronto, 1965) is a professor of fluid and thermal sciences, both in the Mechanical Engineering Department of MIT. All the authors share research interests in thermal and flow problems in boiling water reactor safety.

*William G. Anderson
Richard P. Burke
Peter W. Huber
Ain A. Sonin*



SOME COMPARISONS BETWEEN SMALL-SCALE POOL SWELL EXPERIMENTS AND MODEL PREDICTIONS

Richard P. Burke (top) is a student in the Massachusetts Institute of Technology (MIT) Nuclear Engineering Department. His research interests include modeling of boiling water reactor pressure-suppression pool hydrodynamics and computational steam-generator analysis. **Peter W. Huber** (PhD, mechanical engineering, MIT, 1976) is an assistant professor in the MIT Department of Mechanical Engineering. His interests are in light water reactor thermohydraulics.

*Richard P. Burke
Peter W. Huber*



FILM BOILING AND VAPOR EXPLOSION PHENOMENA

Fred S. Gunnerson (top) (BS, mechanical engineering, Colorado State University, 1972; MS, 1975, and PhD, 1979, nuclear engineering, University of New Mexico) is a senior engineer for the Light Water Reactor Fuel Research Division of EG&G Idaho, Inc. His current research interests include thermal-hydraulics, boiling heat transfer, and interfacial phenomena. **August W. Cronenberg** (BS, mechanical engineering, Newark College of Engineering, 1966; PhD, engineering science, Northwestern University, 1971) is currently an independent consultant involved in heat transfer, fuel behavior, and materials phenomena for reactor safety assessment.

*F. S. Gunnerson
A. W. Cronenberg*



THE RADIANT HEAT TRANSFER IN THE HIGH TEMPERATURE REACTOR CORE AFTER FAILURE OF THE AFTERHEAT REMOVAL SYSTEMS

Gerd Breitbach (top) (Dr. rer. nat., Technical University of Aachen) is a scientist at the Institute of Nuclear Safety Research at the Nuclear Research Centre Jülich. He has worked on problems of heat transfer in pebble-bed reactors at high temperatures and is now concerned with studies of the reliability of high temperature reactor components. **Heinz Barthels** (Dr.-Ing., Technical University of Aachen) is an engineer at the Institute for Reactor Components at the Nuclear Research Centre Jülich. His current works are in the experimental investigation and calculation of the pebble-bed heat transfer at high temperatures.

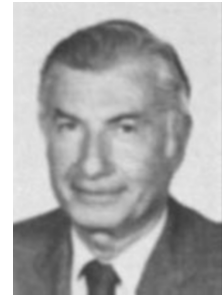
*G. Breitbach
H. Barthels*



OPTIMAL SIZE AND LOCATION OF NUCLEAR POWER PLANTS IN ENERGY PARKS

*Hashem Akbari
Lawrence M. Grossman*

Hashem Akbari (not pictured) (BS, petroleum engineering, Abadan Institute of Technology, Iran, 1971; MS, nuclear engineering, Massachusetts Institute of Technology, 1977; PhD, nuclear engineering, University of California, Berkeley, 1980) is currently a faculty member of the Abadan Institute of Technology. Before coming to the U.S., he worked in problems of reservoir engineering and operations research in the gas and petroleum industry in Iran. His special interests in nuclear engineering are in optimization and systems theory. While a graduate student at Berkeley, he worked on energy projects at the Lawrence Berkeley Laboratory. **Lawrence M. Grossman** (BChE, City College of New York, 1942; MS, mechanical engineering, University of California, Berkeley, 1944; PhD, engineering science, University of California, Berkeley, 1948) joined the faculty of the Department of Mechanical Engineering at Berkeley in 1948 and moved to the Department of Nuclear Engineering in 1958. He was chairman of the Department of Nuclear Engineering from 1969 to 1974, and is currently involved in teaching and research in that department. His special interests are reactor physics, computational methods, and control and optimization problems in nuclear engineering.



EVALUATION MODELS FOR URANIUM EXPLORATION BY ACTIVE NEUTRON LOGGING

*W. A. Woolson
M. L. Gritzner*

William A. Woolson (top) (PhD, nuclear engineering, The Pennsylvania State University, 1970) performed radiation analysis for the NERVA (Nuclear Engine for Rocket Vehicle Applications) program at Aerojet Nuclear Systems Company, Sacramento, California, after graduation. Woolson joined the Applied Physics Group at Science Applications, Inc. (SAI), La Jolla, California, in 1971. Currently, he is manager of the Radiation Transport Division in that group. His research interests focus on the application of Monte Carlo radiation transport techniques for analysis of borehole logging tools, nuclear reactor systems, nuclear weapon effects, visible light optical systems, and high-energy electromagnetic cascade showers. **Michael L. Gritzner** (BS, 1966, and MS, 1968, nuclear engineering, University of Tennessee) was employed by the Computing Technology Center at the Oak Ridge Gaseous Diffusion Plant for two years and then transferred to the Neutron Physics Division of Oak Ridge National Laboratory (ORNL), where he was primarily engaged in the analysis of a number of radiation transport experiments performed at ORNL's Tower Shielding Facility. In 1973, he accepted a position in Huntsville, Alabama, with SAI. He transferred to the Radiation Transport Division of SAI in La Jolla in 1975. He has been engaged in a variety of projects there involving the study of radiation. His most recent efforts have been directed at developing calculation models to assist in the development, evaluation, and calibration of borehole logging tools used in the exploration for uranium ore.



FUEL SURVEY IN THE LIGHT WATER REACTORS BASED ON THE ACTIVITY OF THE FISSION PRODUCTS

Robert Beraha (top right) (Chemist-engineer-licencé es Sciences, University of Aix-Marseille, 1961) was an engineer with Commissariat à l'Énergie Atomique (CEA) and took part in research on radiochemical analysis relating to radiological safety. Since 1972 he has worked within the Fuel Division at Framatome, studying the behavior of irradiated pressurized water reactor (PWR) fuel by analysis of the primary circuit. **Gérard Beuken** (not pictured) is responsible for chemistry and radiochemistry at Centrale Nucléaire de Tihange. **Gérard Frejaville** (top left) (Engineer, Docteur es Sciences, University of Paris XI, 1966) is in charge of the laboratory studying problems related to power reactor operation. This laboratory is part of the Water Reactor Department at CEA. Since 1971, he has worked on the contamination of the PWR primary circuit by corrosion and fission products. **Claude Leuthrot** (bottom right) (CNAM engineer, nuclear physics, 1972) has been working since 1972 on nuclear reactor contamination by fission products. From 1972 to 1976, he was involved in fission product migration studies in the high temperature reactor at CEA and at the Organization for Economic Cooperation and Development "Dragon Project." Since 1976, he has worked in the Light Water Reactor Department of CEA, where his current interests include fission product behavior in the PWR primary circuits. **Yves Musante** (bottom left) (Engineer, Docteur es Sciences, University Claude Bernard Lyon, 1975) has contributed to development studies on the oxidation state of transuranic elements and plutonium at CEA. Since 1976, he has worked on problems related to primary coolant activity (corrosion and fission products), first at CEA in the Département des Réacteurs à Eau, and then at Framatome in the Division Combustible.

*R. Beraha
G. Beuken
G. Frejaville
C. Leuthrot
Y. Musante*



TWO NEAR-TERM ALTERNATIVES FOR IMPROVED NUCLEAR FUEL UTILIZATION

William V. Macnabb (MS, nuclear engineering, University of California, Berkeley, 1962) is assistant general manager of the Energy Systems Division of NUS Corporation. He is currently active in economics and fuel cycle services for the nuclear power industry.

William V. Macnabb



ON-LINE RADIATION MONITORING AT A NUCLEAR FUEL REPROCESSING PLANT

Ken Hofstetter (top) (AB, Augustana College, 1962; PhD, nuclear chemistry, Purdue University, 1967) has been a radiochemistry laboratory supervisor at the Barnwell Nuclear Fuel Plant of Allied-General Nuclear Services (AGNS) since 1974. His primary responsibilities are in the counting room and in the development of nondestructive assay (NDA) monitors. Prior to coming to AGNS, he was an assistant professor of chemistry at the University of Kentucky. He did postdoctoral research for two years at the Cyclotron Institute at Texas A&M following his graduate studies. **William Stroube** (bottom) (BS, chemistry, Murray State University, 1973; PhD, radioanalytical chemistry, University of Kentucky, 1977) is a research chemist working in the area of neutron activation analysis with the U.S. Food and Drug Administration in Washington, D.C. While at AGNS, his main interest was in process radiation monitors.

*K. J. Hofstetter
W. B. Stroube, Jr.
B. C. Henderson
G. A. Huff*



Bob Henderson (top) (BS, Florida State University) has been actively involved in the development and utilization of monitoring systems used for process control, quantitative analysis, and safeguards applications in the nuclear industry since joining AGNS in March 1977. He came to AGNS from the Medical University of South Carolina, where he specialized in nuclear imaging, radiochemistry, and radioimmunoassay. While at Florida State he assisted for two years in the Department of Physics with the operation and maintenance of their 30-MeV Van de Graff accelerator. **George Huff** (bottom) (BS, chemistry, Brigham Young University, 1950) is the manager of Analytical Services at AGNS. His primary interest is special nuclear material measurements, i.e., on-line NDA monitors and laboratory measurements. He has been involved with the design, construction, and preliminary testing of the Barnwell Nuclear Fuel Plant since 1969. Prior to that, he was associated with the startup and operation of the Idaho Chemical Plant, where he worked for 18 years as a section leader in the Analytical Chemistry Department.



HYBRIDS FOR DIRECT ENRICHMENT AND SELF-PROTECTED FISSILE FUEL PRODUCTION

R. W. Conn (top) (BS, chemical engineering, Pratt Institute; MS and PhD, engineering science, California Institute of Technology) is currently professor of engineering and applied science at the University of California, Los Angeles (UCLA). His research interests include the areas of magnetic and inertial confinement fusion reactors and design, fusion plasma physics, and plasma-surface interactions. **F. D. Kantrowitz** (center) (MS, nuclear engineering, University of Wisconsin, 1979) is a graduate student at UCLA. His current research interest is in tandem mirror plasma physics and applications to advanced fuel fusion reactors. **William F. Vogelsang** (bottom) (PhD, physics, University of Pittsburgh, 1956) is professor of nuclear engineering at the University of Wisconsin. His interests have included critical assemblies, neutron diffraction, and nondestructive fuel assay. His research interests are in the radioactivity and safety problems of fusion reactors, and the design and neutronics analysis of fusion and fission systems.

*R. W. Conn
F. Kantrowitz
W. F. Vogelsang*



RADIOACTIVE WASTE

VOLUME REDUCTION OF ORGANIC ALPHA WASTE BY PYROHYDROLYSIS

Alfred Chrubasik (top) (engineering, Technische Universität Gleiwitz, Polonia, 1962) has been with NUKEM GmbH in Hanau, Federal Republic of Germany, since 1978. He has worked in the engineering of incineration processes for contaminated waste and is especially interested in the design of the pilot plant for the pyrohydrolysis of alpha waste. **Jürgen Hofmann** (center) (chemistry, 1972; Dr. rer. nat., Universität Giessen, 1975) has been manager of the Research and Development Section at NUKEM GmbH since 1976. He has worked in fuel chemistry, treatment of nuclear waste, and waste-gas purification processes, and has used the laboratory to study the pyrohydrolytic process chemistry. **Horst Vietzke** (bottom) (chemistry, 1958, Dr. rer. nat., Freie Universität Berlin, 1961) has worked for NUKEM GmbH since 1962. He is presently manager of research and development in the nuclear fuel cycle. He has worked in fuel chemistry, fuel element fabrication, reprocessing, and waste management. He started the pyrohydrolytic process with uranium waste and is co-inventor of this process for alpha waste.

*Alfred Chrubasik
Jürgen Hofmann
Horst Vietzke*



THE SORPTION OF ACTINIDES IN IGNEOUS ROCKS

Bert Allard (top) (MSc, 1970, and PhD, 1975, inorganic and nuclear chemistry, Chalmers University of Technology, Sweden) is a senior scientist at the Department of Nuclear Chemistry, Chalmers University of Technology. He is presently involved in studies of retention and migration of radionuclides in the environment in connection with geological disposal of radioactive waste products. His special interests include actinide solution chemistry. **Gary W. Beall** (center) (PhD, physical chemistry, Baylor University, 1975) is currently group leader of solid waste disposal at Radian Corporation in Austin, Texas. His interests are in the impact of radionuclides on the environment in general and actinides in particular. He has been very active in the development of backfill materials for waste repositories, alternate waste forms for high level waste, and evaluation of migration of nuclides through geologic media. **Thesia M. Krajewski** (bottom) (BS, chemistry and environmental science, Northern Arizona University, 1977; MS, chemistry, The University of Tennessee, 1980) performed her thesis research, involving measuring the sorption of actinides on geologic media, at Oak Ridge National Laboratory.

*B. Allard
G. W. Beall
T. Krajewski*



MATERIALS

IN-PILE MEASUREMENTS OF ZIRCALOY CREEP AND PCMI DEFORMATION COMPARATIVE EVALUATION OF TEN CREEP CORRELATIONS

Erik Kolstad (mechanical engineering, Technical University of Trondheim, Norway, 1967), a senior scientist for the Organization for Economic Cooperation and Development Halden Reactor Project since 1969, is responsible for fuel performance analysis, including heat transfer, fuel rod thermal property, Zircaloy creep, and mechanical behavior.

Erik Kolstad



EXPERIMENTAL EVIDENCE FOR THE USE OF THE GAUSS FUNCTION IN THE FUNCTIONAL DESCRIPTION OF THE DUCTILE-BRITTLE TRANSITION OF FERRITIC STEELS

Gerhard Hofer (top) (MS, materials science, Northwestern University, 1960; PhD, materials science, North Carolina State University, 1966) has been active in reactor materials development, first at Siemens Corporation, and now at Kraftwerk Union. He came to Kraftwerk Union in 1968, after a stint as assistant lecturer at Imperial College of London. His current interest is in physical and mathematical models in reactor-related materials problems. **Chau Chun Hung** (BS, mathematics, University Fu-Jen, Taipei, 1968; Dip. mathematics, Universität Erlangen-Nürnberg, 1975) joined Kraftwerk Union after his graduation. He is working on statistical analysis, mainly in the field of materials science. His current interest is in the application of pattern recognition and non-parametric statistics.

*Gerhard Hofer
Chau Chun Hung*



EXPERIMENTAL AND THEORETICAL DETERMINATION OF HELIUM PRODUCTION IN COPPER AND ALUMINUM BY 14.8-MeV NEUTRONS

Dennis W. Kneff (top right) (PhD, nuclear physics, University of Oregon, 1972) is a research staff member at Rockwell International Corporation's Energy Systems Group. He is currently engaged in the measurement of neutron-induced helium generation cross sections and the development of helium accumulation dosimetry. **Harry Farrar IV** (top left) (PhD, nuclear physics, McMaster University, Canada, 1962) is manager of applied nuclear research at Rockwell International Corporation's Energy Systems Group. He has developed a mass spectrometer system for accurately measuring parts-per-trillion concentrations of helium, and has applied this technique to the development of helium accumulation neutron dosimetry for liquid-metal fast breeder reactor and fusion test neutron environments. **Fred Mann** (bottom right) (PhD, physics, California Institute of Technology, 1975) has worked since 1975 at the Hanford Engineering Development Laboratory (HEDL), where he is engaged as a senior engineer in the evaluation of nuclear data for fast breeder reactors, fusion devices, and light water reactors. His special interest is in the use of nuclear models in evaluations. **Bob Schenter** (bottom left) (PhD, nuclear physics, University of Colorado, 1963) has worked since 1965 at HEDL, where he is currently manager of the Nuclear Analysis Section. This group provides evaluated nuclear data in support of the Fast Flux Test Facility, the Fusion Materials Irradiation Test Facility, and other nuclear facilities.

*D. W. Kneff
Harry Farrar IV
F. M. Mann
R. E. Schenter*



INSTRUMENTS

THE ROUTINE REASSESSMENT OF ABSORBED DOSE IN LiF/POLYTETRAFLUORETHYLENE THERMOLUMINESCENT DOSIMETER ELEMENTS

David T. Bartlett (top) (MA, physics, Oxford University, 1968; MSc, radiobiology, Birmingham University, 1973) is a senior scientific officer at the National Radiological Protection Board (NRPB), Harwell, United Kingdom. He is currently employed in research on applications of thermoluminescence and lyoluminescence dosimetry. **Alastair F. McKinlay** (center) (BSc, natural philosophy, University of Strathclyde, Scotland, 1969; PhD, applied radiation physics, Paisley College of Technology, Glasgow, Scotland, 1975) is a senior scientific officer at NRPB and is engaged in research in dosimetry of both ionizing and nonionizing radiation. **Patricia A. Smith** (bottom) is an assistant scientific officer at NRPB where she has been active in thermoluminescence dosimetry research since 1970.

*D. T. Bartlett
A. F. McKinlay
P. A. Smith*

