



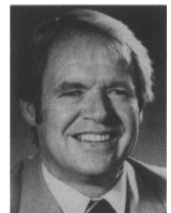
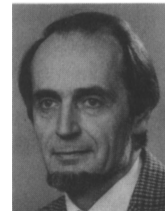
AUTHORS — MARCH 1986

RADIATION PROTECTION AND HEALTH PHYSICS PRACTICES AND EXPERIENCE IN OPERATING REACTORS INTERNATIONALLY

OCCUPATIONAL DOSE REDUCTION EXPERIENCE IN ONTARIO HYDRO NUCLEAR POWER STATIONS

R. Wilson (top right) (BSc Hons, physics, Edinburgh University) is director of the Health and Safety Division of Ontario Hydro. His current interest is reduction of the high fatal accident rate among electrical linemen. **G. A. Vivian** (top left) (BAsC, engineering physics, University of Toronto, Canada) is currently attached to the Audit Division of Ontario Hydro. His recent past interest is in the development of dose reduction processes in heavy water reactor design. **W. J. Chase** (center right) (MSc, medical biophysics, University of Toronto, Canada) recently joined the Institute of Nuclear Power Operations. Prior to that he was a station health physicist at Pickering Nuclear Generating Station. **G. Armitage** (bottom left) (BSc Hons, chemistry, University of Bradford, Canada) is health physics services manager of the Health and Safety Division of Ontario Hydro. He is responsible for providing health physics services to the Ontario Hydro nuclear program and is currently interested in operational dose reduction. **L. J. Sennema** (bottom right) (MSc, physics, University of Western Ontario, Canada) is a supervising design engineer for occupational safety with Ontario Hydro's Design and Development Division. His main interests are in the development and application of design dose reduction techniques to CANDU stations.

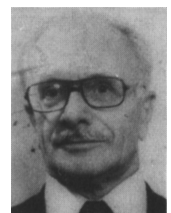
*R. Wilson
G. A. Vivian
W. J. Chase
G. Armitage
L. J. Sennema*



RADIATION PROTECTION PRACTICES AND EXPERIENCE IN FRENCH OPERATING REACTORS

André Gauvenet [Ecole Normale Supérieure (ENS) de St. Cloud, France, physics, 1940; Diplôme d'Etudes Supérieures, mathematics, Paris, France, 1942] has been involved in electronics research and has taught at St. Cloud ENS. He was the science attaché at the French embassy in the United States from 1954 to 1956. From 1956 to 1982, he worked on radiological protection and nuclear safety at the Commissariat à l'Energie Atomique. Since 1982 he has been a general inspector for the safety and security of French nuclear stations with Electricité de France.

André Gauvenet



HEALTH PHYSICS PRACTICES AND EXPERIENCE AT DUKE POWER COMPANY

Lionel Lewis



Lionel Lewis (MS, biophysics, University of Rochester, 1955) received an Atomic Energy Commission fellowship in radiological physics, which he used at Rochester University and at Brookhaven National Laboratory. Since then he has had 30 years of varied experience in the nuclear industry, including that with a naval reactor prototype and a demonstration power reactor (the CVTR).

FISSION REACTORS

FISSION PRODUCT BEHAVIOR IN HIGH-BURNUP WATER REACTOR FUEL SUBJECTED TO SLOW POWER INCREASES

*Per Knudsen
Carsten Bagger
Hans Carlsen
Ib Misfeldt
Mogens Mogensen*

Per Knudsen (top right) (MS, chemical engineering, Technical University of Denmark, 1955) is a staff member of the metallurgy department of Risø National Laboratory and program manager of the Danish fuels development program and the international Risø fission gas projects. **Carsten Bagger** (top left) (MSc, metallurgy, Technical University of Denmark, 1970) has worked as a research scientist at Risø National Laboratory since 1971 on postirradiation examination and performance analysis of water reactor fuels. **Hans Carlsen** (center right) (MSc, chemical engineering, Technical University of Denmark, 1970) has worked at Risø National Laboratory in the metallurgy department since 1971 and is now manager of the hot cells. Since 1975 he has worked with destructive postirradiation examinations of test fuel pins and power reactor pins. His current interest is nuclear fuel performance, especially regarding fission gas and ceramography. **Ib Misfeldt** (bottom left) (MSc, nuclear engineering, 1975; PhD, structural engineering, Technical University of Denmark, 1979) is a research scientist employed by Atlas Denmark A/S AED. He is working on the modeling of light water reactor fuel behavior under a contract for Risø National Laboratory. **Mogens Mogensen** (bottom right) (MSc, chemical engineering, 1973; PhD, electrochemistry, Technical University of Denmark, 1976) has been connected with Risø fission gas projects since 1980. He has taken part in a number of projects dealing with solid state physics, chemistry, and electrochemistry in addition to work on elucidating fission gas release mechanisms.



THE REACTOR CONTAINMENT OF STANDARD-DESIGN GERMAN PRESSURIZED WATER REACTORS

*Wolfgang K. E. Braun
Klaus Hassmann
Hans-Henning Hennies
J. Peter Hosemann*

Wolfgang K. E. Braun (top) [PhD, Stuttgart Technical University, Federal Republic of Germany (FRG)] is a nuclear physicist with Kraftwerk Union (KWU) AG in Erlangen, FRG, where he is a senior vice-president and group executive of KWU's Reactor Divisions. His primary responsibilities at KWU are all development and project work on pressurized water reactors (PWRs), boiling water reactors, and pressurized hot water reactors and on safety and licensing matters. He joined Siemens AG in 1955 and has been active in the nuclear field. **Klaus Hassmann** (bottom) (Dipl. Ing., mechanical engineering, University of Graz, Austria,



1968; PhD, Stuttgart Technical University, FRG, 1977) joined Siemens in 1968 and the Siemens subsidiary KWU in 1973. He has been working on safety issues, in particular on core melt projects sponsored by the Federal Ministry of Research and Technology. He is a department manager and has been responsible for computer code modeling and consequence analyses. In 1984 he changed over to the development of coal gasification combined-cycle power plants for future power generation. **Hans-Henning Hennies** (top) (PhD, nuclear physics, University of Göttingen, FRG, 1960) joined INTERATOM, a German company building nuclear power systems, in 1961; it is now a subsidiary of KWU. He was engaged with development work for ship reactors, sodium-cooled power plants, centrifuge enrichment technology, research reactors, and high-temperature reactors of the pebble bed type. In 1975 he joined Karlsruhe Nuclear Research Center (KfK) as a member of the executive board and became head of the Reactor Development and Safety Research Division, in charge of light water reactor safety, fast breeder development, and fusion technology. **J. Peter Hosemann** (bottom) (PhD, electrical engineering, University of Aachen, FRG, 1970) joined KfK in 1972 as an aerosol behavior expert. Since 1974 he has served as program manager for PWR core meltdown research and two-phase mass flow instrumentation at KfK/PNS. He is head of the BETA and DEMONA programs and he is principal developer of the IMPAIR code for iodine behavior during PWR accidents. He is also head of the KfK task force on source term research, and he was a member of the American Nuclear Society special committee on the same subject as well as of the WASH-1400 update program. Furthermore, he kept close contact with the American Physical Society source term study group.



EFFECTIVE USE OF SENSOR READINGS IN ON-LINE PLANT MONITORING AND ITS APPLICATION TO BOILING WATER REACTOR POWER DISTRIBUTION CALCULATIONS

*Takaharu Fukuzaki
Takashi Kiguchi*



Takaharu Fukuzaki (top) (BS, nuclear engineering, University of Tokyo, Japan, 1971) is a researcher at Energy Research Laboratory of Hitachi, Ltd. He has been engaged in research on computer applications to support operators and engineers of nuclear power plants. His current interests include the improvement of on-line computer systems for core performance evaluation to realize high availability and flexibility of reactor operations. **Takashi Kiguchi** (PhD, nuclear engineering, University of Tokyo, Japan, 1975) is a senior researcher at Energy Research Laboratory of Hitachi, Ltd. He has been engaged in the development of on-line computer systems to monitor and control nuclear power plants. His current interests include knowledge engineering techniques for system design and control.



A DYNAMIC MODEL FOR PRESSURIZED WATER REACTOR ANALYSIS ON MICROCOMPUTERS

Parveen K. Jain

Parveen K. Jain (PhD, nuclear engineering, University of Illinois at Urbana-Champaign, 1981) is a consultant at S. Levy, Inc. in Campbell, California. He has been involved in code development for plant analysis using simulation languages such as the Advanced Continuous Simulation Language and EASY-5. His current interests include applied research in two-phase flow, heat transfer, power plant simulations, and systems modeling for dynamic analysis on mainframe computers as well as mini- and microcomputers.



ALTERNATIVE FUEL CYCLE EVALUATION IN THE FEDERAL REPUBLIC OF GERMANY

Reiner Papp (top) (PhD, technical physics, Technical University of Vienna, Austria, 1971) joined the Institute for Applied Reactor Physics and Systems Analysis at Karlsruhe Nuclear Research Center (KfK) in 1971. Since 1981, he has been a member of KfK's "Alternative *Entsorgung*" project management, responsible for systems analysis of postirradiation fuel cycle alternatives. Between 1977 and 1980, he was a visiting professor in the nuclear engineering department at the University of Arizona. **Klaus-Detlef Closs** [PhD, mechanical engineering, Technical University of Karlsruhe, Federal Republic of Germany (FRG), 1974] joined KfK in 1968. After having worked on fuel element development for fast breeder reactors, he concentrated on back-end fuel cycle activities in 1976. Since 1979, he has managed all activities in the FRG with respect to unprocessed spent fuel disposal. He became head of KfK's Alternative *Entsorgung* project management in 1981.

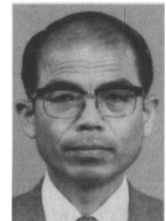
*Reiner Papp
Klaus-Detlef Closs*



FUEL-NUMBER RECOGNITION BY MEANS OF MULTIDIRECTIONAL LIGHTING

Makoto Senoh (top) (Hitachi Ibaraki Technical College, Japan, 1968) is a researcher with Energy Research Laboratory (ERL) of Hitachi, Ltd., Japan. He studied control engineering at the Tokyo Institute of Technology for a year. He has been engaged in developing diagnostic systems for nuclear power plants. His recent interest is image processing for robotic systems. **Sakae Sugiyama** (center) (Hitachi Ibaraki Technical College, Japan, 1963) is a senior researcher with ERL, Hitachi, Ltd. After one year's study of control engineering at Tokyo Institute of Technology, he became engaged in developing control and instrument techniques in nuclear power plants. His interests include the development of techniques for robot maintenance and inspection. He is a member of the Atomic Energy Society of Japan, the Society of Instrument and Control Engineers, the Robotics Society of Japan, and the Japanese Society for Nondestructive Inspection. **Masayoshi Sasaki** (bottom) (BS, mechanical engineering, 1958, and BS, electrical engineering, 1960, Ibaraki University, Japan) is employed in the Hitachi Works of Hitachi, Ltd. His general field of interest throughout his career has been the design and development of electromechanical equipment, especially for nuclear power stations.

*Makoto Senoh
Sakae Sugiyama
Masayoshi Sasaki*



MODEL FOR FUEL/CLADDING CHEMICAL INTERACTION

Kenji Konashi (right) (BS, chemistry, Osaka University, Japan) is an engineer with the Plutonium Fuel Division of the Power Reactor and Nuclear Fuel Development Corporation (PNC). His current interest is in the chemical behavior of fast breeder

*Kenji Konashi
Katsuichiro Kamimura
Yoji Yokouchi*



reactor (FBR) fuel and cladding during irradiation. **Katsuichiro Kamimura** (top) (BS, nuclear engineering, Tokyo University, Japan, 1971) is an assistant senior engineer with the Plutonium Fuel Division of PNC where he designs FBR fuels and evaluates fuel performance. He is currently involved with the Halden Project in Norway. **Yoji Yokouchi** (bottom) (BS, 1966, and MS, 1968, nuclear engineering, Tohoku University, Japan) is a general manager of the Fuel Technology Section of the Plutonium Fuel Division of PNC. He is responsible for developing plutonium-uranium mixed-oxide fuel technology (fuel design, irradiation behavior analysis, and fuel fabrication) for FBRs and advanced thermal reactors.



MICROSCOPIC INVESTIGATION INTO THE IRRADIATION BEHAVIOR OF U_3O_8 -AI DISPERSION FUEL

Gerard L. Hofman (top) (PhD, metallurgy, University of Florida, 1971) has been with Argonne National Laboratory (ANL) in the Experimental Breeder Reactor-II and Material Science Divisions. He is presently working on the development of low-enriched fuels for research and test reactors, the development of metallic fuel for the Integral Fast Reactor, and on failed fuel element behavior. **George L. Copeland** (center) (BS, University of Alabama, 1963; MS, Rensselaer Polytechnic Institute, 1965; and PhD, University of Tennessee, 1975, metallurgical engineering) has recently joined the Development Division at the Y-12 Plant in Oak Ridge, Tennessee. He is currently involved in physical metallurgy of uranium alloys. **John E. Sanecki** (bottom) is an engineering associate in the Irradiation Performance Group, Materials Science and Technology Division, ANL. He has specialized in scanning electron beam instruments since 1965, and contributed to the design of a facility dedicated to Auger and x-ray analysis of radioactive materials. He has recently been involved in scanning electron microscopy and Auger analysis on samples from the Three Mile Island Unit 2 reactor.

*Gerard L. Hofman
George L. Copeland
John E. Sanecki*

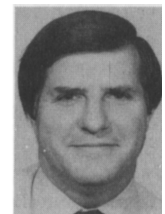


MATERIALS

THE USE OF RECONSTITUTED CHARPY SPECIMENS TO EXTEND R. E. GINNA REACTOR PRESSURE SURVEILLANCE DATA

Regis P. Shogan (top) (MS, metallurgy and material science, Carnegie-Mellon University, 1971) is supervisor of the Nuclear Service Section at the Westinghouse Research and Development Center. He is responsible for remote handling and testing of reactor materials. He has 19 years of experience studying the effects of reactor environments on structural components, particularly mechanical properties and failure mechanisms. **Stephen E. Yanichko** (center) (BS, metallurgical engineering, University of Pittsburgh, 1957) is a senior engineer in the materials technology department of the Westinghouse Water Reactor Division. His main interests involve evaluating the effects of radiation on reactor pressure steels. **William S. Galloway** (bottom) (BS, metallurgical engineering, Rensselaer Polytechnic Institute, 1956) is the metallurgical engineer in the Materials Engineering Division of the Rochester Gas and Electric Corporation (RG&E). He is responsible for evaluating materials problems in RG&E's operating power plants.

*Regis P. Shogan
Stephen E. Yanichko
William S. Galloway*



A ${}^2\text{D}(\gamma, n){}^1\text{H}$ TRITIATED WATER DETECTOR WITH ${}^{232}\text{U}/{}^{228}\text{Th}$ SOURCE

Norman P. Baumann (top) (BSE, physics, 1951, and PhD, nuclear physics, 1955, University of Kansas) is a research associate at the Savannah River Laboratory (SRL). His primary area of interest has been experimental reactor physics with emphasis on neutron transport and neutron-induced reactors applied to nondestructive isotopic assays and to reactivity monitoring. **Willard G. Winn** (BS, physics, 1961, and ME, nuclear engineering, 1974, University of Virginia; PhD, nuclear physics, Cornell University, 1968) is a staff physicist in the Environmental Technology Division of SRL. His primary areas of interest are nondestructive nuclear materials appraisal; alpha, beta, and gamma spectroscopy; and neutron activation analysis.

*Norman P. Baumann
Willard G. Winn*



SPATIAL VARIABILITY OF THE DISTRIBUTION COEFFICIENTS OF ${}^{137}\text{Cs}$, ${}^{65}\text{Zn}$, ${}^{85}\text{Sr}$, ${}^{57}\text{Co}$, ${}^{109}\text{Cd}$, ${}^{141}\text{Ce}$, ${}^{103}\text{Ru}$, ${}^{95m}\text{Tc}$, AND ${}^{131}\text{I}$ IN A CULTIVATED SOIL

Heinz Bachhuber (top) [PhD, physical chemistry, University of Munich, Federal Republic of Germany (FRG), 1970] is a research scientist in the Analysis and Ecology of Radionuclides Group at the Gesellschaft für Strahlen- und Umweltforschung München (GSF). His interests include the separation of lithium isotopes by ion exchange and the migration of radionuclides in various soils. **Kurt Bunzl** (center) (PhD, physical chemistry, University of Munich, FRG, 1964) is leader of the Analysis and Ecology of Radionuclides Group at the GSF. His current interests include sorption processes, the transport of radionuclides and heavy metals in the soil, chemical analysis and distribution of radionuclides in the environment, and statistical methods. **Wolfgang Schimmack** (bottom) (PhD, physical chemistry, Technical University of Munich, FRG, 1975) is a physicist in the Analysis and Ecology of Radionuclides Group at the GSF. His special interests involve model calculations of radionuclide migration in the soil and their experimental examination by field and laboratory experiments. He is also working on problems related to the sorption of toxic heavy metals by soil organic matter.

*Heinz Bachhuber
Kurt Bunzl
Wolfgang Schimmack*



MOVEMENT OF DROPLETS IN THE CENTRIFUGAL SETTLER

Hiomichi Fumoto (top) (BS, MS, and PhD, nuclear chemical engineering, University of Tokyo, Japan) has been a doctoral research associate at the Institute for Chemical Technology of Kernforschungsanlage Jülich (KFA) from 1979 to 1982, doctoral associate at the University of Tokyo from 1982 to 1983, and a senior researcher at the Industrial Research Institute, Japan, since 1983. His current interest is in a separation process for radioactive waste to recycle rare metals. **Ryohei Kiyose** (BS, physics, 1951; MS, chemical engineering, 1954; and PhD, nuclear engineering, 1976, University of Tokyo, Japan) is a professor of nuclear chemical engineering at the University of Tokyo and is interested in reprocessing and waste management technology and safety aspects of nuclear fuel facilities.

*Hiomichi Fumoto
Ryohei Kiyose*

