



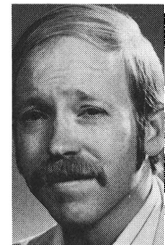
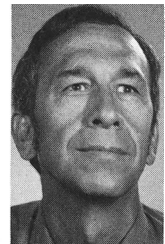
AUTHORS — JUNE 1980

NUCLEAR POWER REACTOR SAFETY

VISUAL IN-PILE FUEL DISRUPTION EXPERIMENTS

Gilbert L. Cano (top) (BS, 1954, MS, 1960, and PhD, 1964, physics, New Mexico State University) has been a member of the technical staff of Sandia Laboratories since 1964. As an experimentalist in atomic and nuclear physics, he has worked in weapons testing, ion-matter interactions, laser fusion, and is now working in fast reactor safety. He served as science and energy advisor to the governor of New Mexico from 1975 to 1976. **Raymond W. Ostensen** (center) (BS, physics, Brooklyn College, 1960; MS, physics, University of Dayton, 1967; PhD, nuclear engineering, University of Illinois, 1973) is a member of the technical staff of Sandia Laboratories. Formerly at Argonne National Laboratory, he has worked on theoretical studies of core disruptive accidents in liquid-metal fast breeder reactors (LMFBRs) for several years. **Michael F. Young** (bottom) (BS, physics, Rensselaer Polytechnic Institute, 1970; MS, physics, 1972, and PhD, nuclear engineering, 1976, University of Illinois) is a member of the technical staff at Sandia Laboratories. He has been working on the analysis of core disruptive accidents in LMFBRs for several years, particularly in regard to fuel pin failure and fuel-coolant interaction.

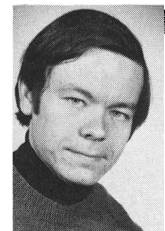
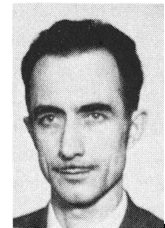
*G. L. Cano
R. W. Ostensen
M. F. Young*



STUDY OF PROGRESSIVE DAMAGE TO REINFORCED CONCRETE STRUCTURES SUBMITTED TO DYNAMIC REVERSED LOAD

A. M. Sokolovsky (top right) (Licence es Sc./App. Mechanics, Doctorat sp. Paris-Orsay, 1962) has been at the Institut de Protection et de Sûreté Nucléaire, Commissariat à l'Energie Atomique, Fontenay-aux-Roses, France, since 1973. Currently, he is working on nuclear safety problems related to dynamic effects on nuclear plants, with special interest in seismic design. **M. Livolant** (top left) (anc. él. de l'Ecole Polytechnique) is head of the Service d'Etudes de Mécanique et Thermique des Structures of the Division d'Etudes et de Développement des Réacteurs for the Commissariat à l'Energie Atomique in Saclay, France. **J. Gauvain** (bottom right) (ingénieur de l'Ecole Central des Arts et Manufactures) and **A. Hoffmann** (bottom left) (anc. él. de l'Ecole Polytechnique) both work in the area of structural mechanics at the Service d'Etudes de Mécanique et Thermique des Structures.

*A. M. Sokolovsky
M. Livolant
J. Gauvain
A. Hoffmann*



THE HYDRODYNAMICS OF LARGE-SCALE FUEL-COOLANT INTERACTIONS

M. Baines (top right) (BA, physics, Cambridge University, 1971) joined Central Electricity Generating Board (CEGB) Berkeley Nuclear Laboratories in 1975 and since then has worked on aspects of molten fuel-coolant interaction (MFCI) in liquid-metal fast breeder reactors (LMFBRs). **S. J. Board** (bottom right) (BS, physics, 1965, and PhD, gamma-ray astronomy, 1968, Southampton University) is head of the Thermal Hydraulic Safety Studies Section at CEGB Berkeley Nuclear Laboratories. He joined CEGB in 1968 and has worked on fast reactor and, more recently, water reactor safety topics, concentrating mainly on thermohydraulic aspects. **Nigel E. Buttery** (top left) (BA, physics, 1970, and D. Phil., theoretical physics, 1974, Oxford University) joined CEGB Berkeley Nuclear Laboratories in 1974. His main area of work lies in the analysis of LMFBR hypothetical core disruptive accidents and their containment. **R. W. Hall** (bottom left) (BA, physics, 1968, and PhD, radio astronomy, 1973, Cambridge University) joined CEGB Berkeley Nuclear Laboratories in 1973, and has researched aspects of MFCI in LMFBRs and water reactors.

M. Baines
S. J. Board
N. E. Buttery
R. W. Hall

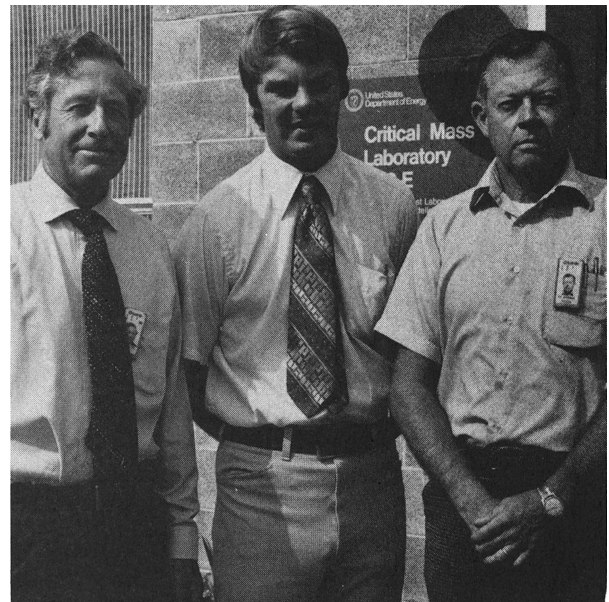


REACTORS

CRITICAL EXPERIMENTS WITH CONCRETE-REFLECTED FAST TEST REACTOR FUEL PINS IN WATER

S. R. Bierman (right) (BS, chemical engineering, Texas Technological University, 1956; MS, nuclear engineering, University of Washington, 1963) has been involved in both the chemical processing industry and criticality research and analysis. He is now a staff scientist at the Critical Mass Laboratory at Pacific Northwest Laboratory (PNL), where he has been active in both the generation of basic experimental criticality data and the utilization of these data in performing criticality analyses of production plant systems. He is current chairman of the Nuclear Criticality Safety Division of the American Nuclear Society. **B. M. Durst** (center) (BS, physics, University of Washington, 1971; MS, nuclear engineering, Louisiana State University, 1974) is a research scientist at PNL, where he has been actively involved in the generation of both basic experimental and computational criticality data. **E. Duane Clayton** (left) (PhD, physics, University of Oregon, 1952) is currently associate manager of criticality analysis at PNL, and is a research associate professor in the University of Washington's Department of Nuclear Engineering. He is a pioneer in criticality studies with plutonium, and since its inception in 1961, has been director of the Plutonium Critical Mass Laboratory of PNL. His current technical interests include most aspects of criticality measurements and studies. **B. W. Howes** (photograph not available) (BS, physics, Idaho State University, 1963; MS, physics, University of Idaho, 1969) has been engaged in various aspects of the nuclear fuel cycle and has maintained a long-standing interest in reactor theory while performing criticality safety research. He is now assisting in the management of a program at PNL that will assess the long-term safety of geologic repositories.

S. R. Bierman
B. M. Durst
E. D. Clayton
B. W. Howes



CONTROL OF OXYGEN, HYDROGEN, AND TRITIUM IN SODIUM SYSTEMS AT EXPERIMENTAL BREEDER REACTOR II

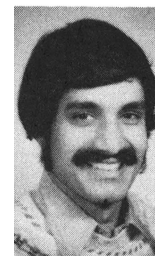
Marilyn M. Osterhout (MS, chemistry, University of Florida, 1972) has been employed at Argonne National Laboratory in Idaho since 1974. She is a staff chemist in the Experimental Breeder Reactor II (EBR-II) Plant Chemistry Group. Her interests include water-to-sodium leak detection, impurity monitoring and control, and technical training programs.



THE ANALYSIS OF BOILING WATER REACTOR LONG-TERM COOLING

R. T. Lahey, Jr. (top) [BS, U.S. Merchant Marine Academy; MS, Rensselaer Polytechnic Institute (RPI); ME, Columbia University; PhD, Stanford University] is currently chairman of the Department of Nuclear Engineering at RPI. Before coming to RPI, he was employed by the General Electric Company in various technical and managerial positions. His interests are in the areas of two-phase flow dynamics and light water reactor safety. At present he is a member of the Board of Directors of the American Nuclear Society. **P. Kamath** (B. Tech., mechanical engineering, Indian Institute of Technology, Madras; MS, nuclear engineering, RPI) is currently a doctoral candidate involved in research in the area of two-phase flow at RPI.

*R. T. Lahey, Jr.
P. S. Kamath*



DEVELOPMENT OF A REMOVABLE CLOSURE FOR LARGE CAVITIES IN HIGH TEMPERATURE REACTOR PRESTRESSED CONCRETE REACTOR VESSELS

Sepp R. Speidel (top) (Dipl. Ing., civil engineering, University of Stuttgart, Germany, 1970) has worked for the Krupp Company and was employed with the detail engineering of the Thorium High Temperature Reactor built in Germany. Currently he works for Bilfinger + Berger Bauaktiengesellschaft as head of the Nuclear Civil Engineering Department. His interest is the application of modern concrete technology for nuclear power stations. **Wolf H. Plettenberg** (Dipl. Ing., Technical University of West Berlin, 1969) is a civil engineer. His task at Bilfinger + Berger is to design and analyze structural components, especially of nuclear power plants.

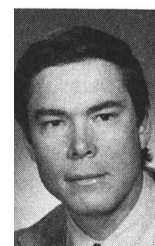
*S. R. Speidel
W. H. Plettenberg*



ACOUSTIC MEASUREMENT OF PENETRATION OF LIQUID SODIUM INTO LIMESTONE CONCRETE

Herbert J. Sutherland (top) (PhD, engineering mechanics, University of Texas at Austin, 1970) is a staff member in the Geotechnology Research Division at Sandia Laboratories. His work has been in the areas of acoustic and finite-amplitude wave propagation in composite and viscoelastic materials. His current interests are the development of instrumentation for reactor safety experiments and the development of centrifuge simulation techniques for geological structures. **John E. Smaardyk** (center) (PhD, solid state physics, University of Illinois, 1976) is a staff member in the Thermomechanical and Physical Research Division of Sandia Laboratories. His current activities are in the continuing sodium/concrete interaction test program and in equation-of-state studies of reactor fuel materials. **L. A. Kent** (bottom) (AET, Sandia Laboratories, 1975) is an engineering and science assistant in the Thermal Test and Analysis Division at Sandia Laboratories. He developed acoustic and finite amplitude wave propagation techniques for composite and viscoelastic materials. Currently, he is the facility operator for the sodium/concrete interaction test program.

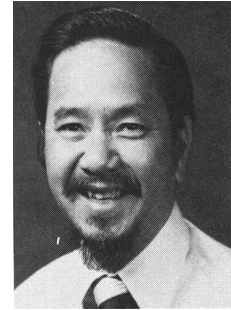
*H. J. Sutherland
J. E. Smaardyk
L. A. Kent*



THE UNCERTAINTY IN ACCIDENT CONSEQUENCES CALCULATED BY LARGE CODES DUE TO UNCERTAINTIES IN INPUT

Dong H. Nguyen (BS, 1960, and MS, 1961, nuclear engineering, Purdue University; PhD, nuclear engineering, University of California at Berkeley, 1965) is currently a principal engineer at the Hanford Engineering Development Laboratory. His research interests have been in the areas of charged particle transport, neutron physics, and nuclear reactor dynamics. Recently, he has been involved in liquid-metal fast breeder reactor safety analysis, including the probabilistic approach to fast reactor risk assessment.

Dong H. Nguyen



IN-REACTOR MEASUREMENT OF NEUTRON ABSORBER PERFORMANCE

Glenn W. Hollenberg (center) (BS, ceramic engineering, University of Missouri at Rolla, 1967; PhD, material science, University of Utah, 1971) is a senior engineer in the Absorber Development Section at the Hanford Engineering Development Laboratory (HEDL). His special interests include ceramic fabrication, absorber irradiation performance, modeling, and component design. Prior to joining HEDL, he served in the U.S. Air Force at the Air Force Materials Laboratory. **John L. Jackson** (right) (BS, chemistry, University of Washington, 1950) is an advanced engineer in the Absorber Development Section at HEDL. His 28 years of experience in the nuclear field include work on irradiation effects on reactor materials, experimental design, measurements of flux, fluence, and spectra in fast reactors, and the design of in-reactor experiments for fast reactors. His present interests are the pre- and post-irradiation examination of absorber experiments in the Fast Flux Test Facility (FFTF). **John A. Basmajian** (left) (BS, metallurgical engineering, Purdue University, 1956; MS, metallurgical engineering, Rensselaer Polytechnic Institute, 1961) is a principal engineer at HEDL and has 22 years of experience in nuclear materials technology, the last 18 of which he has worked in fast reactor materials behavior. He is currently responsible for the FFTF neutron absorber irradiation experimentation effort.

*G. W. Hollenberg
J. L. Jackson
J. A. Basmajian*

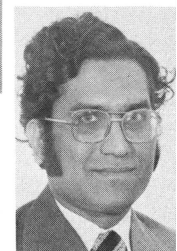
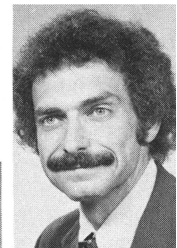
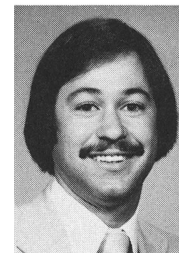


REACTOR SITING

IMPLICATIONS OF IN-CHANNEL PLUGGING DURING FAST REACTOR OVERPOWER EXCURSIONS

David W. Varela (top) [BS, nuclear engineering, University of Arizona, 1976; MS, nuclear engineering, University of California, Los Angeles (UCLA), 1978] is a member of the technical staff at Sandia Laboratories. He was involved in a recent study of the application of event trees to liquid-metal fast breeder reactor (LMFBR) systems and is currently project leader of the Molten Fuel Pool Program. He is conducting in-pile and high-temperature furnace experiments to examine interactions and containment of molten reactor core materials. **William E. Kastenberg** (center) (PhD, nuclear engineering, University of California, Berkeley, 1966) is professor of engineering and applied science at UCLA. His research interests include LMFBR safety, fusion technology, and risk assessment. **Vijay K. Dhir** (bottom) (PhD, mechanical engineering, University of Kentucky, Lexington, 1972) has been assistant professor of engineering and applied science at UCLA since 1974. His research interests include thermal hydraulics of nuclear reactors and reactor safety problems.

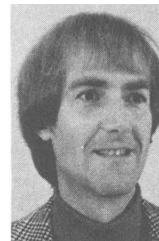
*David W. Varela
William E. Kastenberg
Vijay K. Dhir*



A URANIUM-PLUTONIUM-NEPTUNIUM FUEL CYCLE TO PRODUCE ISOTOPICALLY DENATURED PLUTONIUM

Peter Wydler (top right) (Dipl. Phys., 1961, and Dr. Sc. Nat., 1968, nuclear physics, Swiss Federal Institute of Technology, Zürich) joined the Swiss Federal Institute for Reactor Research (EIR) in 1961. For three years he stayed at the Atomic Research Establishment in Harwell, where he performed work in the field of neutron thermalization. Later he was involved in integral measurements on the EIR critical facility Proteus. Since 1975, he has been leader of a reactor physics group that deals with advanced systems. **Walter Heer** (top left) (Dipl. Phys., Swiss Federal Institute of Technology, Zürich, 1961) has been at EIR since 1961. He has performed reactor physics experiments in the subcritical assembly Minor and the mixed critical reactor Proteus. He is presently involved in fuel cycle calculations. **Peter Stiller** (bottom right) (Dipl. Phys., Techn. Hochschule Darmstadt, Federal Republic of Germany, 1971) was involved in calculations for cancer therapy by neutrons and in theoretical radiation damage studies for reactor materials. Since joining EIR in 1974, he has been responsible for nuclear data libraries and has participated in reactor calculations. **H. U. Wenger** (bottom left) (Dipl. Nat. Sci., chemical physics, 1960, and Dr. Sc. Nat., microwave spectroscopy, 1969, Swiss Federal Institute of Technology, Zürich) did experimental and theoretical work on internal rotation and quadrupole interactions in molecules at University College of North Wales, Bangor. Before joining EIR in 1976, he worked as a computer systems specialist in industry. His present interests are in computer applications and in fast reactor physics.

*P. Wydler
W. Heer
P. Stiller
H. U. Wenger*



CHEMICAL PROCESSING

ISOTOPE DILUTION ALPHA SPECTROMETRY FOR THE DETERMINATION OF PLUTONIUM CONCENTRATION IN IRRADIATED FUEL DISSOLVER SOLUTION: IDAS AND R-IDAS

M. V. Ramaniah (PhD, nuclear chemistry, Washington University, 1956) is head of the Radiochemistry Division and director of the Radiological Group at the Bhabha Atomic Research Centre (BARC). His field of interest includes nuclear fission, chemistry of plutonium and other actinides, and nuclear materials accounting and safeguards. **H. C. Jain** (PhD, chemistry, Bombay, 1971) is leading the Mass Spectrometry Section in the Radiochemistry Division at BARC. His interests are in nuclear data measurements, postirradiation studies, nuclear materials accounting, and studies involving mass spectrometry and alpha spectrometry in nuclear technology. **S. K. Aggarwal** (BSc, Honours, Guru Nanak, 1972) has been working since 1973 in the Mass Spectrometry Section at BARC. His previous experience included development of tracer technique for input accountability of plutonium. Currently he is working on the measurement of the half-lives of transactinium isotopes and applications of mass spectrometry and alpha spectrometry in the nuclear fuel cycle. **S. A. Chitambar** (MSc, nuclear chemistry, Poona, 1966) is currently working in the fields of mass spectrometry and alpha spectrometry at BARC. His interests include determination of fission yields, rare earths in fuel materials,

*M. V. Ramaniah
H. C. Jain
S. K. Aggarwal
S. A. Chitambar
V. D. Kavimandan
A. I. Almaula
P. M. Shah
A. R. Parab
V. L. Sant*

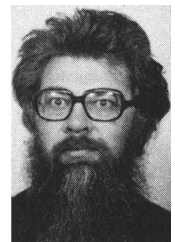
and studies on trace levels of uranium, plutonium, and gadolinium in reactor coolant water. **V. D. Kavimandan** (MSc, chemistry, Banaras, 1961) is currently working in the field of mass spectrometry, and is doing analytical work connected with the nuclear fuel cycle at BARC. His previous experience included catalytic oxidation of paraffins, chemical methods for the estimation of plutonium, and nuclear data measurements. **A. I. Almula** (BSc, chemistry, Gujarat, 1967) is currently working in the Mass Spectrometry Section at BARC. Earlier, he was engaged in Mossbauer spectroscopy and reactor coolant studies. **P. M. Shah** (BSc, chemistry, Gujarat, 1968) is currently working in the Mass Spectrometry Section at BARC. He previously worked on the determination of plutonium by chemical methods and half-life measurements. **A. R. Parab** (BSc, chemistry, Poona, 1975) has been working in the Mass Spectrometry Section of BARC since 1976. **V. L. Sant** (MSc, chemistry, Bombay, 1974) is currently working in the Mass Spectrometry Section at BARC. (Photographs of this group of authors were not available at the time of publication.)

FUELS

PELLET AND SPHERE-PAC (U,Pu)C FUEL COMPARATIVE IRRADIATION TESTS

Albert Delbrassine (top) (Civil Engineer, chemistry, University of Brussels, 1966) is a senior engineer at the Belgian National Nuclear Research Institute. He is presently involved in the Fuel Group and is in charge of the irradiation and post-irradiation examination of experimental liquid-metal fast breeder reactor fuel pins. His main interests lie in the chemistry of the irradiated fuels. **L. Smith** worked for the United Kingdom Atomic Energy Authority between 1956 and 1974 on the post-irradiation examination of reactor fuel assemblies and core components. Since 1974, he has been responsible for fuel post-irradiation examination at the Swiss Federal Institute for Reactor Research.

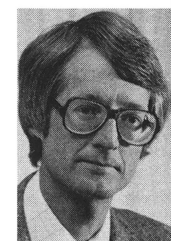
*A. Delbrassine
L. Smith*



DEVELOPMENT AND IRRADIATION PERFORMANCE OF URANIUM ALUMINIDE FUELS IN TEST REACTORS

J. M. Beeston (top) (BS, chemical engineering, 1949, and PhD, metallurgical engineering, 1953, University of Utah) has been associated with materials problems in nuclear energy at the Idaho National Engineering Laboratory (INEL) for the past 21 years. His work has been in planning, examination, and analysis of irradiation behavior in fuels and structural materials. His current technical interests include irradiation effects in fuels and structural materials, and failure analysis and fracture mechanics of irradiated materials. **Richard R. Hobbins** (bottom) (AB, chemistry, Princeton University, 1960; PhD, metallurgy, University of Delaware, 1969) is manager of the Program Development and Evaluation Branch in the Thermal Fuels Behavior Program at EG&G Idaho, Inc. Since joining INEL in 1969, he has served in the Fuels and Materials Division as a metallurgist studying the irradiation performance of uranium-aluminide fuels and as section supervisor directing the post-irradiation examination of light water reactor (LWR) fuels tested under postulated accident conditions. His current interests are centered around LWR fuel safety and include the

*J. M. Beeston
R. R. Hobbins
G. W. Gibson
W. C. Francis*



chemical and mechanical behavior of Zircaloy cladding and UO_2 fuel and fission product release under a wide variety of hypothesized reactor transients. **G. W. Gibson** (right) (BS, metallurgical engineering, University of Arizona, 1943; MS, metallurgical engineering, University of Idaho, 1966) has worked at INEL since 1958, mainly in the development and testing of fuel for use in test and power reactors. At present he is manager of the Fuels Management Branch of the EG&G Idaho Test Reactor Technical Support Division. In this position, he is concerned with the production and use of fuel elements for the test, research, and training reactors throughout the U.S. A biography and photograph of **W. C. Francis** were not available.



RADIOACTIVE WASTE

A MODEL FOR THE TRANSPORT OF RADIONUCLIDES AND THEIR DECAY PRODUCTS THROUGH GEOLOGIC MEDIA

H. C. Burkholder
E. L. J. Rosinger

H. C. Burkholder (top) (PhD, chemical engineering, University of Washington, 1973) is a manager with the Project Management Division of the Battelle Memorial Institute. He is currently involved in the development, validation, and application of modeling technology to evaluate the performance of nuclear waste isolation systems. **E. L. J. Rosinger** (PhD, chemistry, Technical University, Prague, 1968) is a scientist with Atomic Energy of Canada, Limited, where she is involved with environmental and safety assessment within the Canadian Nuclear Fuel Waste Disposal Program. She has worked on the modeling of various chemical processes in the nuclear industry and is currently performing analyses of the long-term isolation capability of a deep underground disposal vault.

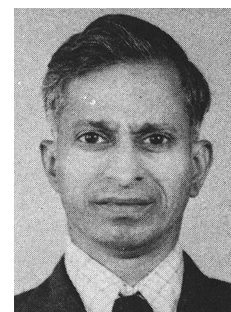


INSTRUMENTS

INTENSITY MEASUREMENTS IN X-RAY FLUORESCENCE ANALYSIS

T. V. Krishnan

T. V. Krishnan (BSc, 1952, and MS, 1954, Madras University; PhD, University of Bombay, 1971) is presently working as deputy manager of the research section of the Research and Development Centre of Indian Oil Corporation. He was a lecturer in physics from 1954 to 1957 at St. Thomas and Christ College and Kerala University, and a research scholar from 1957 to 1960 at the Technological Laboratory, Bombay. From 1960 to 1973 he was at the Bhabha Atomic Research Centre, and he joined Indian Oil Corporation in 1973. Since 1960, he has been working in x-ray spectroscopy—both theoretical and experimental. His areas of interest have included Lamb shift in x rays, energy levels, intensities width of lines, mesonic x rays, extended absorption edges, fluorescence, and analytical applications of x-ray fluorescence.



MEASUREMENT OF THE Ge(Li) DETECTOR EFFICIENCY FOR GAS BOMB GEOMETRIES

Robert J. Gehrke (right) [BS, mathematics, De Paul University, 1962; MS, physics, University of Nevada, 1966] is a senior experimenter in the Physics Branch of EG&G Idaho, Inc., at the Idaho National Engineering Laboratory (INEL). He joined INEL in 1965 and has broad experience in x- and gamma-ray spectroscopy. Presently, he is active in beta- and gamma-radiation metrology and fission product decay studies. **Jesse I. Anderson** (left) (BS, chemistry, Brigham Young University, 1938) was employed by the U.S. Army Airforce, U.S. Army Chemical Corps, and U.S. Atomic Energy Commission for 27 years before joining EG&G Idaho, Inc., in 1975. He has focused his career on developing methods for the measurement of radionuclides in environmental samples and human subjects. He retired in 1977. **David H. Meikrantz** (center) (BS, chemistry, Iowa Wesleyan College, 1968) is a senior radiochemist with Exxon Nuclear Idaho at INEL. He has worked as a technical staff member conducting actinide partitioning research for nuclear waste management. He is currently involved in the rapid separation of selected fission product elements for nuclear decay scheme studies.

*R. J. Gehrke
J. I. Anderson
D. H. Meikrantz*

