



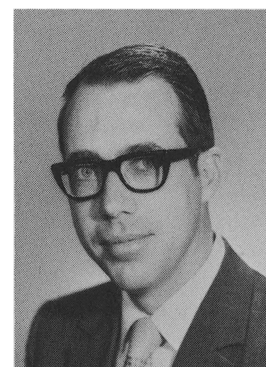
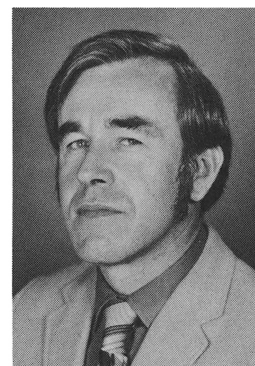
# AUTHORS — AUGUST 1971

## SYMPOSIUM ON FUEL ROD FAILURE AND ITS EFFECTS

### PREFACE

P. L. Rittenhouse (top) (MS, metallurgical engineering, University of Tennessee) is presently group leader in the Metals and Ceramics Division of Oak Ridge National Laboratory and technical coordinator of the U.S. Atomic Energy Commission sponsored work on light-water reactor fuel rod failure. R. A. Dean (PhD, University of Pittsburgh, 1970) is technical director of the LWR Fuel Division at Gulf General Atomic where he is responsible for the direction of all GGA technical efforts relating to LWR fuel design and coordination with British Nuclear Fuels, Ltd.

*P. L. Rittenhouse  
R. A. Dean*

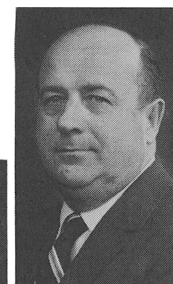


## FUELS

### EFFECTS OF HEATING RATE AND PRESSURE ON EXPANSION OF ZIRCALOY TUBING DURING SUDDEN HEATING CONDITIONS

Adrian D. Emery (top right) (BS, chemical engineering, Vanderbilt University, 1949) is an engineer in the Materials Group, Nuclear Laboratories, Nuclear Power Department of Combustion Engineering. He is currently engaged in studies of pressure vessel steel. David B. Scott (left) (MS, metallurgical engineering, University of Pittsburgh, 1966), supervisor of the Core Materials Section of the Materials Group, is responsible for the fuel cladding and grids in the nuclear cores of the nuclear steam supply systems. John R. Stewart (bottom right) (MS, engineering science, Rensselaer Polytechnic Institute, 1961), manager of the Materials Group, is responsible for all the materials related to the manufacture of nuclear steam supply systems.

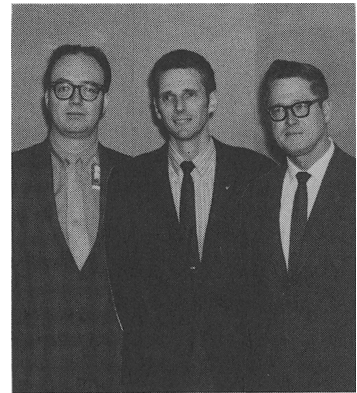
*A. D. Emery  
D. B. Scott  
J. R. Stewart*



## COMPARISON OF RUPTURE DATA FROM IRRADIATED FUEL RODS AND UNIRRADIATED CLADDING

D. O. Hobson (left) (MS, metallurgy, University of Tennessee) has worked since 1964 on studies of zirconium and its alloys and since 1969 in the LWR Fuel Rod Failure Program. M. F. Osborne (center) is a physicist in the ORNL Reactor Chemistry Division. His primary interests and experience are in the effects of irradiation on reactor fuels and cladding materials and in fission product behavior. G. W. Parker (right) (MS, chemistry, University of Tennessee) has worked on problems associated with nuclear safety, primarily, fission product release and reactor accident simulation research, and is a member of the ANS-5 Subcommittee on standards for Energy and Fission Product Release.

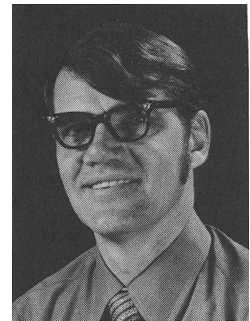
*D. O. Hobson  
M. F. Osborne  
G. W. Parker*



## MEASUREMENT OF LIGHT-WATER REACTOR COOLANT CHANNEL REDUCTION ARISING FROM CLADDING DEFORMATION DURING A LOSS-OF-COOLANT ACCIDENT

Ralph D. Waddell, Jr. (BS, civil engineering, University of Tennessee) has been with the Metals and Ceramics Division of Oak Ridge National Laboratory since 1961. He was involved with light-water reactor safety studies at the time this work was performed and is presently concerned with the behavior of structural materials for LMFBR vessels and components.

*R. D. Waddell, Jr.*



## FUEL ROD FAILURE UNDER LOSS-OF-COOLANT CONDITIONS IN TREAT

R. A. Lorenz (right) (BS, chemical engineering, Iowa State University, 1951) has had 10 years experience with the design, operation, and analysis of nuclear safety oriented in-pile experiments at Oak Ridge National Laboratory, particularly in the field of fission product release. D. O. Hobson (left) (MS, metallurgy, University of Tennessee) has worked since 1964 on studies of zirconium and its alloys and since 1969 in the LWR Fuel Rod Failure Program. G. W. Parker (center) (MS, chemistry, University of Tennessee) has worked on problems associated with nuclear safety, primarily, fission product release and reactor accident simulation research, and is a member of the ANS-5 Subcommittee on standards for Energy and Fission Product Release.

*F. A. Lorenz  
D. O. Hobson  
G. W. Parker*



## APPLICATION OF EXPERIMENTAL DATA TO ANALYTICAL EVALUATION OF CLADDING FAILURE DISTRIBUTION

Billy E. Bingham (left) is a member of the System Dynamic Methods Group at The Babcock & Wilcox Company. He is actively engaged in system design and analyses and in safety evaluations for water reactors and breeder reactors. Arthur L. Lowe, Jr. is a member of the Mechanical Analysis & Design Group at The Babcock & Wilcox Company. His main interest is materials and their application to reactor internals including clad materials.

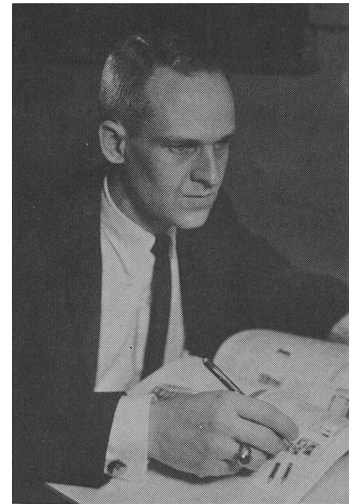
*B. E. Bingham  
A. L. Lowe, Jr.*



**THE EFFECTS OF CLAD SWELLING ON EMERGENCY CORE COOLING PERFORMANCE**

Wayne A. Carbiener (mechanical engineering, nuclear engineering, Purdue University) is associate chief of the Nuclear Engineering and Analysis Division of the Battelle Columbus Laboratories. He originally joined Battelle as a member of the Battelle Research Reactor staff. He is currently director of the Nuclear Reactor Accident Analytical Project with special interests in emergency core cooling systems performance.

*Wayne A. Carbiener*



**THE EFFECT OF ZIRCALOY-CLAD FUEL ROD FAILURE ON BWR CORE SPRAY COOLING**

John D. Duncan (left) (MS, University of California, 1968) has performed test and analytical work for the AEC-sponsored Full Length Emergency Cooling Heat Transfer Project (FLECHT) since he joined the General Electric Company Atomic Power Equipment Department (APED) Development Engineering Group in 1968. Richard G. Bock (center) (BS, Pennsylvania State University, 1951) is project manager of the FLECHT Program. James E. Leonard (right) (MS, University of California, 1969) is a development engineer at APED and has been closely associated with the evaluation of BWR emergency core cooling systems for the past four years.

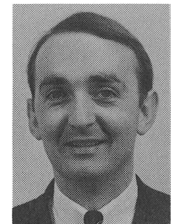
*Richard G. Bock  
John D. Duncan  
James E. Leonard*



**THE EFFECT OF FUEL ROD FAILURE ON EMERGENCY CORE COOLING SYSTEM DESIGN FOR BOILING WATER REACTORS**

J. E. Hench (left) (PhD, Stanford University, 1967) is manager, Thermal-Hydraulics Component of Systems Engineering, Atomic Power Equipment Department, General Electric Company, San Jose. His duties include design and specification of the Emergency Core Cooling Systems for the BWR and other activities related to LOCA. D. J. Liffengren (BSME, South Dakota School of Mines and Technology, 1956) is a senior engineer in the same group and is working on performance evaluation.

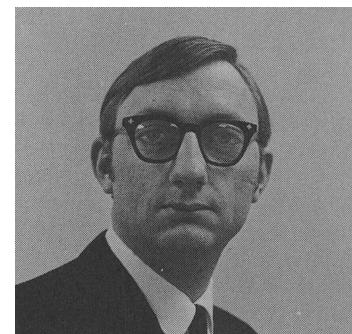
*J. E. Hench  
D. J. Liffengren*



**EXPERIMENTAL STUDIES OF THE EFFECT OF FLOW RESTRICTIONS IN A SMALL ROD BUNDLE UNDER EMERGENCY CORE COOLANT INJECTION CONDITIONS**

P. R. Davis (BS, physics, University of Wyoming, 1961; Oak Ridge School of Reactor Technology, 1962) is chief of the LOFT (Loss of Fluid Test) Program Planning and Support Section, Idaho Nuclear Corporation. His responsibilities include the formulation of an experimental program for the LOFT facility, which is directed toward obtaining critical information relative to safety of large commercial light-water reactors.

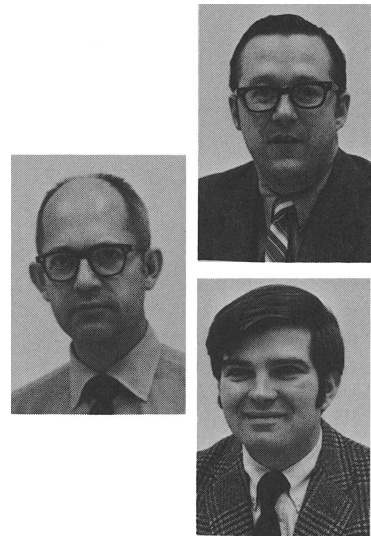
*P. R. Davis*



**EFFECT OF FLOW BLOCKAGE ON BOTTOM FLOODING HEAT TRANSFER EFFECTIVENESS (FLECHT)**

Jim Cermak (top right) (PhD, nuclear engineering, University of Maryland) is manager of Thermal and Hydraulic Engineering with responsibility for Westinghouse PWR core heat transfer. Bob Leyse (left) (BS, chemical engineering, University of Wisconsin) is a senior engineer in the WNES heat transfer laboratory. Dave Dominicis (bottom right) (MS, mechanical engineering, Pennsylvania State University) is an analytical engineer responsible for data reduction and analysis.

*J. O. Cermak  
R. H. Leyse  
D. P. Dominicis*

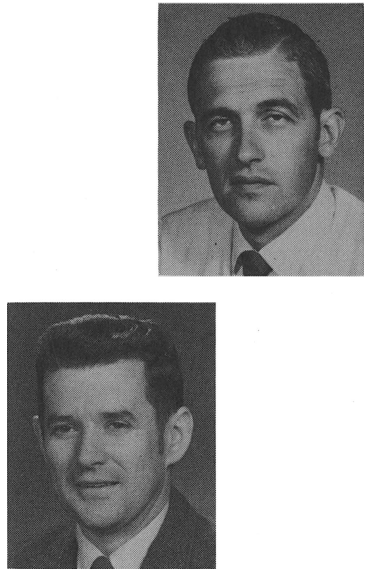


**REACTORS**

**DYNAMIC NEUTRONIC AND MECHANICAL MEASUREMENTS WITH A PULSE REACTOR OF URANIUM-MOLYBDENUM ALLOY**

J. A. Reuscher (top) (PhD, nuclear engineering, Texas A&M University) is a staff member in the Reactor Studies Division at Sandia Laboratories. His activities have included the study of the kinetic and mechanical characteristics of pulsed reactors and the behavior of fissile materials under rapid fission heating. John T. Mihalczo (PhD, nuclear engineering, University of Tennessee) has been a staff member of the Oak Ridge Critical Experiments Facility, Union Carbide Corporation for the past 12 years. He has been active in a variety of static and kinetic experiments and their analyses. His current interests include statistical fluctuation experiments and their analyses.

*John T. Mihalczo  
Jon A. Reuscher*



**FUELS**

**BEHAVIOR OF MIXED OXIDE (U,Pu)O<sub>2</sub> FUELS AS A FUNCTION OF TEMPERATURE AND BURNUP**

R. M. Carroll (right) and O. Sisman are members of the Reactor Chemistry Division of the Oak Ridge National Laboratory. O. Sisman has been at Oak Ridge since 1944 and is chief of the Reactor Materials Section. R. M. Carroll is the group leader for fission-product behavior studies, and has been at Oak Ridge since 1948.

*R. M. Carroll  
O. Sisman*



**THROUGH-THICKNESS NEUTRON FLUENCE AND EM-BRITTLEMENT GRADIENTS IN REACTOR PRESSURE VESSELS**

*C. Z. Serpan, Jr.  
H. E. Watson*

C. Z. Serpan, Jr. (left) (BS, Ohio University, 1956) is engaged in neutron dosimetry and spectrum aspects of irradiation effects studies of reactor structural materials at the Naval Research Laboratory. H. E. Watson (BS, Clemson University, 1961) is a mechanical engineer in charge of the High Level Radiation Laboratory Hot Cell Facility at NRL and is responsible for design and the conduct of all remote testing and evaluation operations.



**UNDERWATER CHARGING MACHINE FOR NUCLEAR IRRADIATION SAMPLE INSERTION**

*R. M. Collins*

Roger M. Collins is currently with the Westinghouse R&D Center Manufacturing Development Laboratory. As one of his assignments with the Ground Support Equipment group of the Westinghouse Astronuclear Laboratory, he led an engineering team in developing the basic design for the underwater charging machine and prepared the analytical engineering report on the machine for Space Nuclear Propulsion Office review.



**NEW ENCAPSULATION TECHNIQUES FOR THE FABRICATION OF CALIFORNIUM-252 NEUTRON SOURCES**

*R. D. Baybarz  
J. B. Knauer  
J. R. Peterson*

R. D. Baybarz (top right) (BS, chemistry, Walla Walla College, 1955) works at Oak Ridge National Laboratory in the field of transplutonium element process development and research. He is group leader for final transplutonium element separations. J. B. Knauer, Jr. (left) (MS, inorganic chemistry, University of Tennessee, 1967) is currently engaged in transplutonium element separations and development of techniques for californium neutron source fabrication. J. R. Peterson (bottom right) (PhD, University of California, Berkeley, 1967) is presently assistant professor of Chemistry at the University of Tennessee and a consultant to the Chemistry Division at Oak Ridge National Laboratory. Research interests include the determination and interpretation of the basic physical and chemical properties of the transuranium elements.

