

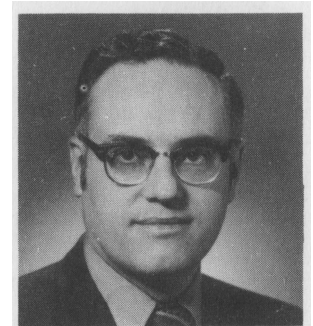
AUTHORS — MAY 1973

A REVIEW OF PLUTONIUM UTILIZATION IN THERMAL REACTORS

PREFACE

Loren C. Schmid (PhD, physics, University of Michigan, 1958) has been working in the nuclear field for 18 years and has been involved in the plutonium recycle field since 1959. He is the author of numerous publications in the nuclear decay scheme analysis and reactor physics field, including the textbook *Critical Assemblies and Reactor Research*. Schmid is currently the director of energy programs at Battelle-Northwest and an acting associate professor in the Nuclear Engineering Department at the University of Washington.

Loren C. Schmid

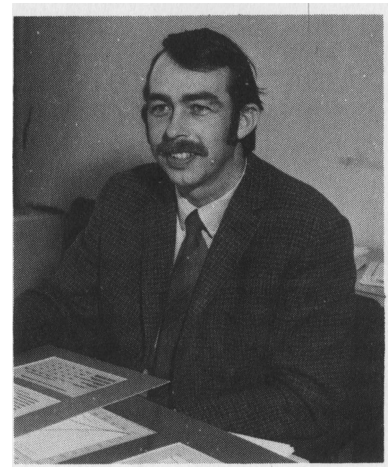


REACTORS

THE VALUE OF PLUTONIUM RECYCLE IN THERMAL REACTORS

D. E. Deonigi

Duane E. Deonigi (BS, mechanical engineering, Washington State University, 1959) is presently manager of Economics and Operations Research at Pacific Northwest Laboratories, Richland, Washington. From 1960 to 1969, Deonigi was responsible for economic analysis of plutonium-using fuel cycles; this work included plutonium value analysis, detailed plutonium isotopic determination and cost associated with fuel fabrication, and the reprocessing of spent fuels. During this period, he authored approximately 30 technical papers.



PLUTONIUM FUEL TECHNOLOGY, PART I: PLUTONIUM FUEL FABRICATION

D. W. Brite

D. W. Brite (BS, chemistry, University of Kansas) is a senior research engineer who has been involved in development and fabrication of nuclear fuels and radioisotope heat sources at Hanford for several years, formerly with the General Electric Company and presently with Battelle-Northwest. He is currently interested in $\text{PuO}_2\text{-UO}_2$ mixed-oxide fuels fabrication and development.



PLUTONIUM FUEL TECHNOLOGY, PART II: RADIATION EXPOSURE FROM PLUTONIUM IN LWR FUEL MANUFACTURE

R. C. Smith

L. G. Faust

L. W. Brackenbush

R. C. Smith (center) (MS, Oregon State University) is employed at Westinghouse Hanford Company in Fuels Development and Recycle. He is currently interested in the radiation exposure and characterization of plutonium. Leo G. Faust (left) (BS, physics, Humboldt State College) is a senior research scientist at Battelle-Northwest. He is currently technical leader of the Fast Fuels Radiation Exposure Program concerned with the characterization of high exposure plutonium. L. W. Brackenbush (right) (MS, nuclear technology, Washington State University) is a research scientist at Battelle-Northwest, where he is involved with plutonium and neutron dosimetry problems. His most recent interests include the use of tissue equivalent proportional counters to make absolute neutron dose measurements and to experimentally determine quality factors from LET distributions.



PLUTONIUM FUEL TECHNOLOGY, PART III: NUCLEAR CRITICALITY SAFETY CONSIDERATIONS IN LWR (Pu,UO_2) FUEL FABRICATION

C. L. Brown

L. C. Davenport

D. R. Oden

C. L. Brown (center) (BS, chemistry, University of Utah, 1947) is the technical leader for criticality safety analysis at Battelle-Northwest. His experience includes 11 years in plutonium production and 13 years in nuclear criticality safety. He has had a primary interest in $\text{PuO}_2\text{-UO}_2$ fuel criticality safety since the mixed-oxide fuel fabrication plant was built at Hanford. L. C. Davenport (right) (PhD, nuclear engineering, University of Washington, 1968; BS, engineering physics, Montana State, 1959) has been involved in both experimental and calculational work in the fields of criticality research, reactor physics, and electronic engineering for 11 years. He has over 4 years' experience in nuclear criticality safety, and is presently a criticality safety specialist at Battelle-Northwest. His research interests also include neutron spectrum measurements in mixed-oxide assemblies. Dale R. Oden (left) (BS, engineering physics, University of Toledo, 1963; MS, nuclear engineering, University of Washington, 1972) has been involved in both experimental and analytical studies in the areas of reactor physics and criticality safety for 10 years. He has 5 years' experience in the area of nuclear criticality safety, and is presently a criticality safety specialist at Battelle-Northwest.



THE NEUTRONICS OF PLUTONIUM RECYCLING

V. O. Uotinen (right) (MS, physics, Worcester Polytechnic Institute, 1963) has been involved in experimental and analytical studies of the neutronics of plutonium recycling for the past nine years. His interests are in reactor neutronics and nuclear fuel management. B. R. Leonard, Jr. (left) (PhD, physics, University of Wisconsin, 1952) is a staff physicist at Battelle-Northwest. He has performed and directed research in the measurement and analysis of neutron cross sections at Hanford and is actively engaged in the evaluation of nuclear data for ENDF/B. Ronald C. Liikala (center) (BS, physics, MS, nuclear engineering, Michigan Technological University, 1961) has been involved in plutonium recycle research for the past 11 years. In his present position as manager of engineering analysis in the Systems Engineering Department of Battelle-Northwest he is involved in research studies spanning the various stages of the nuclear fuel cycle.

*V. O. Uotinen
B. R. Leonard, Jr.
R. C. Liikala*



UO₂-PuO₂—A DEMONSTRATED FUEL FOR PLUTONIUM UTILIZATION IN THERMAL REACTORS

M. D. Freshley (BS, University of Portland) is a research associate in the Fuels and Materials Department at Battelle-Northwest. As technical program leader, he has been involved in plutonium recycle fuel development in conjunction with the Plutonium Utilization Program since the inception of the program at Hanford in 1958. His current interests continue to be in the areas of reactor fuel performance and design.

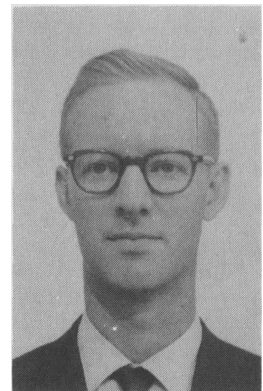
M. D. Freshley



DECONTAMINATION OF PLUTONIA-CONTAMINATED THERMAL REACTOR SYSTEMS

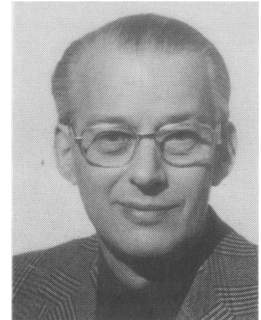
J. R. Divine (BS, chemical engineering, University of California, Berkeley, 1961; PhD, chemical engineering, Oregon State University, 1965) is a registered professional engineer in the State of Washington. Since 1965, he has been employed by Battelle-Northwest where his main interests have been in the area of corrosion product transport in the coolant of nuclear reactors.

J. R. Divine

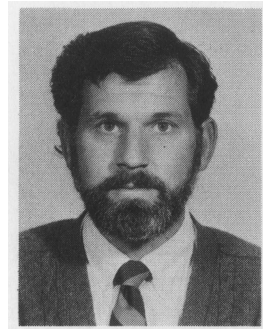


THE CONVERSION OF URANIUM HEXAFLUORIDE TO URANIUM DIOXIDE*Sven G. Brandberg*

Sven G. Brandberg (MS, chemical engineering, The Royal Institute of Technology, KTH, Sweden, 1948) has been working with development and production of nuclear fuel at ASEA-ATOM (formerly the ASEA Nuclear Department) since 1959. He is also an associate professor in chemical technology at KTH. Brandberg is presently manager for a project to build a conversion plant at ASEA-ATOM and is engaged in research work on the dry conversion process at KTH.

**THERMAL EFFECTS OF UNDERGROUND NUCLEAR EXPLOSIONS***R. W. Taylor*

Robert W. Taylor (PhD, Pennsylvania State University, 1960) is a geochemist at the Lawrence Livermore Laboratory. He has worked with solid electrolytes, thermoelectric materials, and phase equilibria in minerals and rocks, and he is currently studying thermochemical effects of nuclear explosions for the Plowshare Program.

**EBR-II FEEDBACK TRANSFER FUNCTION COMPARISON FOR ROD-DROP AND ROD-OSCILLATOR EXPERIMENTS***H. A. Larson
I. A. Engen*

H. A. Larson (top) (PhD, University of Washington, 1971) is a staff member of Argonne National Laboratory's EBR-II Project, working in the area of reactor analysis. His current interests involve reactor dynamics. I. A. Engen (MS, University of Idaho, 1970), also a staff member of EBR-II Project, has worked in the area of computer applications since 1963. Currently his interests concern reduction of experimental data and operational support.

