



nuclear technology

CONTENTS — OCTOBER 1972

EDITOR

ROY G. POST
Department of Nuclear Engineering
University of Arizona,
Tucson, Arizona 85721

ANS OFFICERS

JAMES R. LILIENTHAL, *President*
JOHN W. SIMPSON, *Vice President-President Elect*
J. ERNEST WILKINS, Jr., *Treasurer*
OCTAVE J. DU TEMPLE, *Executive Secretary*

ANS STAFF

NORMAN H. JACOBSON, *Publications Manager*
RUTH FARMAKES, *Assistant Staff Editor*
ELSIE W. COX, *Copy Editor*
SIEGFRIED H. KRAPP, *Production Manager*
KATHRYN L. FROELICH, *Production Assistant*
MERRILL ALBERTUS, *Production Coordinator*

Advertising

RICHARD HARRIS, *Advertising Sales Manager*
ROSEMARY HARVEY, *Circulation Manager*

EDITORIAL ADVISORY BOARD

SPENCER H. BUSH, ERIC T. CLARKE, VAUGHN E. CULLER, GARY J. DAU, W. KENNETH DAVIS, MILTON C. EDLUND, WALTER H. ESSELMAN, PAUL R. FIELDS, JOHN H. FRYE, JR., STEPHEN J. GAGE, O. H. GREAGER, MARSHALL GROTENHUIS, VINCENT P. GUINN, DAVID B. HALL, DANIEL F. HANG, JOSEPH M. HENDRIE, PAUL KRUGER, STEPHEN LAWROSKI, FORREST J. REMICK, WALTON RODGER, ZOLTON ROSZTOCZY, WILSON TALLEY, EDWIN L. ZEBROSKI

Address all manuscript and editorial communications to the editorial offices, *Nuclear Technology*, Department of Nuclear Engineering, The University of Arizona, Tucson, Arizona 85721.

Nuclear Technology is published monthly by the American Nuclear Society, Inc., with executive and business offices at 244 East Ogden Avenue, Hinsdale, Illinois 60521, telephone 312/325-1991. Subscription rate is \$30 or \$110/four volumes per year. Single copy price is \$13 (special issue slightly higher). It is printed in Danville, Illinois, and second class postage is paid at Hinsdale, Illinois, and at additional mailing offices. Copyright © 1972 by the American Nuclear Society, Inc.

Statements made by authors of contributions to the various departments or of technical papers and notes do not necessarily reflect the viewpoint of the American Nuclear Society nor should their appearance herein be construed as tacit approval or endorsement by the Society. Abstracts in *Nuclear Technology* may be freely republished anywhere at any time.

ON THE COVER:

The cover of this month's special issue of the Proceedings of the Topical Conference held in Richland, Washington is a composite of an area map of the AEC Hanford Reservation and two micrographs produced by the Hanford Engineering Development Laboratory's one-million-volt electron microscope. The photographs at 75 000X and 150 000X are of Type 304 stainless steel irradiated to 7×10^{22} n/cm² at 405°C. The cover is courtesy of Westinghouse Hanford Company.

REACTOR MATERIALS PERFORMANCE

Preface / W. E. Roake, T. T. Claudson - - - - - 12

TECHNICAL PAPERS

MATERIALS

Damage Function Analysis of Austenitic-Steel Neutron-Induced Mechanical Property Change Data / R. L. Simons, W. N. McElroy, L. D. Blackburn - - - - - 14

SCIM—A Theory Based Computer Code for the Prediction of the In-Pile Behavior of Type 304 Stainless Steel / S. D. Harkness, R. Grappel, S. G. McDonald - - - - - 25

An Analysis of the Effects of Hydrostatic Stress on Swelling / J. L. Straalsund, G. L. Guthrie - - - - - 36

Effect of Neutron Irradiation on the Ductility of Austenitic Stainless Steel / E. E. Bloom, J. R. Weir, Jr. - - - - - 45

The Interrelationship Between Swelling and Irradiation Creep / W. G. Wolfer, J. P. Foster, F. A. Garner - - - 55

An Evaluation of the Effect of Intergranular Attack on Fuel Pin Burst Properties / P. J. Ring, K. D. Challenger, H. J. Busboom - - - - - 64

Performance of Mixed-Oxide Fuel Elements to 11 at.% Burnup / L. A. Neimark, J. D. B. Lambert, W. F. Murphy, C. W. Renfro - - - - - 75

Fuel-Cladding Mechanical Interaction in LMFBR Fuel Rods / B. F. Rubin, T. J. Black, W. K. Appleby, J. D. Stephen, R. F. Hilbert - - - - - 89

The Mechanical Design of TRISO-Coated Particle Fuels for the Large HTGR / T. D. Gulden, C. L. Smith, D. P. Harmon, W. W. Hudritsch - - - - - 100

High Burnup Mixed-Oxide Fuel Irradiation Experiments / M. Coquerelle, J. Gabolde, R. Lesser, P. Werner - - - 110

Porosity and Actinide Redistribution During Irradiation of (U, Pu)O₂ / W. J. Lackey, F. J. Homan, A. R. Olsen - - - 120

Postirradiation Observations of Mixed Oxides with Initial Addition of Fission Product Elements / M. Conte, M. Mouchnino, F. K. Schmitz - - - - - 143

The Development of CYGRO-F for Fuel Rod Behavior Analysis / B. L. Harbourne, M. S. Beck, J. P. Foster, A. Biancheria - - - - - 156

Examination of F3A Series Unencapsulated Mixed-Oxide Fuel Pins Irradiated in EBR-II / W. H. McCarthy, K. J. Perry, G. R. Hull, J. W. Bennett - - - - - 171

Boron Concentration Gradient for Improved Thermal Reactor Performance of Boron-Stainless-Steel Control Rods / R. J. Beaver, A. E. Richt - - - - - 187

(Continued on next page)

Irradiation-Induced Dimensional Change in Boronated Graphite / <i>O. M. Stansfield</i> - - - - -	197
Empirical Helium Release Function from Thermal Reactor Irradiated Boron Carbide / <i>G. E. Russcher, A. L. Pitner</i> -	208
Performance Modeling of Neutron Absorbers / <i>F. J. Homan</i> - - - - -	216
Irradiation Behavior of Boron Carbide / <i>G. L. Copeland, R. G. Donnelly, W. R. Martin</i> - - - - -	226
Irradiation Effects in Boron Carbide Pellets Irradiated in Fast Neutron Spectra / <i>J. A. Basmajian, A. L. Pitner, D. E. Mahagin, H. C. F. Ripfel, D. E. Baker</i> - - - - -	238
The Structure of Sodium Corrosion Deposits and Their Effect on Heat Transfer Coefficients / <i>W. E. Ray, R. L. Miller, S. L. Schrock, G. A. Whitlow</i> - - - - -	249
Sodium Corrosion and Mass Transfer Analysis with an Ion Probe Mass Spectrometer / <i>E. Berkey, G. G. Sweeney, W. M. Hickam</i> - - - - -	263
Materials Creep Behavior and Elevated Temperature Design / <i>L. D. Blackburn, J. C. Tobin, R. A. Moen</i> - - -	278
Creep Data Acquisition and Application to Reactor Component Design / <i>D. J. Ayres, T. M. Cullen</i> - - - - -	287
Estimates of Creep-Fatigue Interaction in Irradiated and Unirradiated Austenitic Stainless Steels / <i>C. R. Brinkman, G. E. Korth, R. R. Hobbins</i> - - - - -	297
Effect of Irradiation on the Strain Rate Dependence of Type 304 Stainless-Steel Mechanical Properties / <i>J. M. Steichen</i> - - - - -	308
Fatigue-Crack Growth in 20% Cold-Worked Type 316 Stainless Steel at Elevated Temperatures / <i>Lee A. James</i> -	316
Postirradiation Creep of Annealed Type 316 Stainless Steel / <i>A. J. Lovell</i> - - - - -	323
Structural Materials Aspects of LMFBR Core Restraint System Design / <i>W. E. Pennell</i> - - - - -	332

DEPARTMENTS

AUTHORS - - - - -	3
-------------------	---