AUTHORS AND PAPERS

The highly condensed summaries of papers and technical notes (below) are intended to assist the busy reader in determining the order in which to read the technical material. Biographical comments are for human interest.

Th-20wt%U FUEL UNDER TRANSIENT HEATING

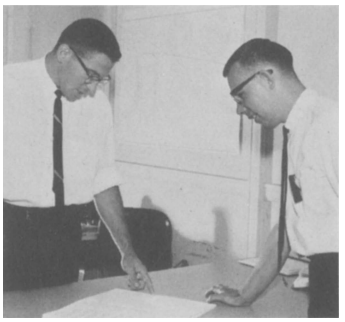
Sodium-bonded Th-20%U fast-reactor-type elements were studied in transient meltdown experiments ranging up to complete sample meltdown in tests conducted in the TREAT reactor, and reported here. The high melting thorium matrix supported the fuel during transient heating at temperatures significantly beyond the solidus. The dominant mechanism of fuel movement was gravity. Internal pressure was not effective in ejecting fuel upon cladding failure.

R. Stewart, C. E. Dickerman, and L. E. Robinson (shown l to r in group photo) are members of the Argonne National Laboratory Reactor Physics Division. For the past few years they have specialized in fast-reactor safety studies. B. Blumenthal (PhD, Technical University, Berlin, Germany) has been a member of the ANL Metallurgy Division since 1948. He is presently interested in the development of thorium fuels for fast power breeder reactors.

CROSSED-PROGENY FUEL CYCLES

Crossed-progeny fueling systems are those in which a reactor, such as a PWR, would burn ^{233}U in natural uranium and supply plutonium to a D_2O reactor, which, in turn, would burn plutonium in thorium and supply ^{233}U for the PWR. Optimum moderator-to-fuel ratios, determined here for these systems, are influenced noticeably by plutonium credits, but little by processing costs. Uranium-233 in natural uranium is an attractive fuel in a PWR, as is plutonium-in-thorium in a D_2O reactor.

D. E. Deonigi is a Senior Research Engineer with Advanced Concepts and Analysis Section of the Mathematics Department at Battelle Memorial Institute's Pacific Northwest Laboratory. For the past six years he has been concerned with development of computer codes for analysis of nuclear and economic factors in reactor fuel cycles.



FTR NEUTRONICS

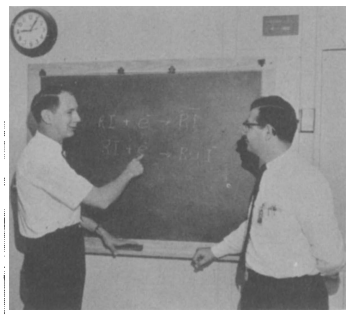
The neutronics characteristics of four possible driver fuels for the Fast Test Reactor (FTR) are compared in this article. The fuels investigated are PuO_2-SS and UO_2-SS cermets and PuO_2-$^{238}UO_2$ and UO_2-$^{238}UO_2$ ceramics. For core volumes of $\approx$ 600 liters, cermet fuels offer a higher neutron flux and a larger shutdown coefficient than oxide ceramic fuels. If the latter are used, BeO could be added to enhance the Doppler coefficient.

Winston Little (shown on left) and Wayne Hardie are manager and member, respectively, of the Fast Reactor Physics Unit at Battelle-Northwest. The principal task of this unit is the physics design of the FTR. Little received his PhD in Nuclear Engineering from MIT in 1964; Hardie received his BS in physics from South Dakota State in 1964.

CONSERVATION ECONOMICS

The interactions of the characteristics of light-water, advanced-converter, and breeder reactors with respect to consumption of uranium, production of plutonium, and national electric power capacity, are computed in this analysis, to about year 2020. For a wide range of conditions and levels of developmental effort, the introduction of low gain breeders by 1975 and of high gain breeders by 1990 will result in cumulative uranium usage by 2020 below the level at which very high price uranium ore will be required.

W. I. Neef (shown on left) and E. D. Jones, Jr., are in the Advanced Concepts and Analysis Section of the Mathematics Department of Battelle-Northwest. Neef (BS, University of Nebraska; MS, University of Washington) has done work in the engineering economics of production reactors and is engaged in the analysis of our national nuclear energy resources. Jones (BS, Washington University, St. Louis) has worked in analog simulation of nuclear reactors and is now analyzing the production potential for radioisotopes in power reactors.



VOLATILE FISSION-PRODUCT IODINE

Organic iodides, presumably derived from interaction between fission-product iodine and process solvent, were detected and identified by gas chromatography in the exhaust air from the Purex process at the Savannah River Plant. Three of ten peaks obtained were tentatively identified as alkyl iodides.

Stuart R. Smith (r.) is a chemist in the Radiological and Environmental Sciences Division at the Savannah River Laboratory where for five years he has been studying the behavior of radioiodine in radiochemical separations processes. His BS degree (chemistry) is from Case Institute of Technology. David L. West has been an analytical chemist at SRL since 1954 specializing in gas chromatography. He received his MS degree (organic chemistry) from the University of South Carolina in 1953.

SHIELD OPTIMIZATION

The problem of shielding shipboard reactors is complicated by the added expense of shield weight. In this work, a shipboard reactor shield system consisting of a water-lead primary shield and a concrete-lead-polyethylene secondary shield, is optimized to the point where further reductions in weight exceeds the worth of these reductions to the ship. Five dose constraints were used in this application of the optimum gradient technique.

Henri Fenech (shown on left) is Associate Professor of Nuclear Engineering at Massachusetts Institute of Technology. He has an MS and ScD from MIT and over ten years of industrial experience in the power production field. He has been a consultant to several nuclear organizations, and is a former member of the staff at General Atomic. William B. Terney is a doctoral candidate in the Nuclear Engineering Department at MIT. He received an MS from MIT in 1962 and then worked for two years at KAPL, from where he is on a leave of absence.

ACTIVATION ANALYSIS OF BLOOD

A procedure for the analysis of copper and zinc in blood and blood serum is described in this paper. Radiochemical techniques are used for the elimination of interferences such as that from ^{24}Na, and both copper and zinc are recovered from a single sample. Analysis time for a single sample is about two hours. Sixteen samples in duplicate can be processed in approximately twelve hours.

J. A. Sondel, G. P. Tercho, and C. C. Thomas (shown l to r) were all members of the Research Department of the Western New York Nuclear Research Center at the time this paper was written. Thomas is Research Manager and has been associated with the Center for five years. His major interests are activation analysis, radiation chemistry, and radiation biology. Tercho, formerly Senior Research Scientist at the Center, is currently Chief Chemist at Vanguard Studios in Hollywood, California. Sondel's work is in the field of activation analysis. He is a Junior Research Scientist and has been associated with the Center for four years.

DEAD TIME ANALYSIS

This Technical Note describes a computer deadtime calculation program using paralyzable and nonparalyzable models in linear combination. The program can be used for the detection of electronic difficulties in the instrumentation.