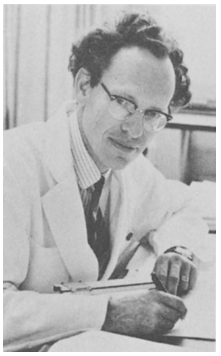
AUTHORS AND PAPERS

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.

Pu EXTRACTION WITH UCl_3

The distribution of plutonium between molten uranium-plutonium alloys (containing 0.2 to 4.2% plutonium) and UCl_3 was examined at 1150 and 1200°C. Results from the experiments were used to evaluate equilibrium constants for the reaction $UCl_3 + Pu \rightleftharpoons PuCl_3 + U$. Equilibrium constants of 200 at 1150°C and 170 at 1200°C were believed sufficiently large to show promise for application of chloride slagging techniques to the processing of metallic-breeder blanket material.

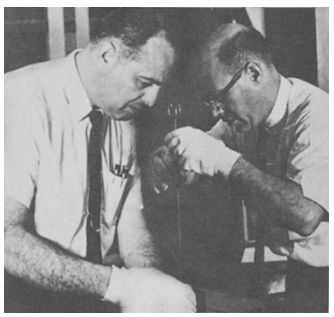
N. R. Chellew (shown on left) and R. K. Steunenberg are Associate Chemists in the Chemical Engineering Division at the Argonne National Laboratory. Both men have had several years of experience in development of pyrochemical methods for processing nuclear fuels. Steunenberg is Section Head in charge of pyrochemical research and engineering concerned with fuel processing.



REACTIVITY METER

The reactivity meter described in this paper has been tested satisfactorily on two Scandinavian reactors, the Halden BWR in Norway, and the Agesta R3 reactor in Sweden. The design is based on extensive use of passive networks. Gain and phase curves for reactivity-to-power transfer functions are provided.

Arne J. W. Andersson has been employed by AB Atomenergi, Sweden, since 1951. At present, he belongs to a group doing research on thermal reactors. During the last two years, he has devoted himself to problems concerned with obtaining and measuring voids in exponential and zero-power reactors, and measurements of conversion ratios in such assemblies. He spent two and one-half years on leave from his parent organization working with the reactor dynamics group at the Halden BWR, Norway.



ECONOMICS OF UO_2 FUEL

An analysis and comparison is made in this paper of the costs associated with 5-MW operation of uranium-aluminum and UO_2-fueled research reactors, and for 1-MW operation of uranium-aluminum-, uranium-zirconium-hydride-, and UO_2-fueled reactors. Results indicate that uranium-aluminum fuel is most economic at low power, low utilization, and that UO_2 has decided economic advantage above 250 to 300 MWd/year.

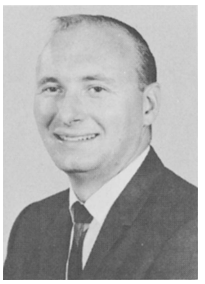
The authors have worked together for over three years on a cooperative program between their organizations to develop and place into operation a UO_2-fueled research reactor. Ralph Lumb received his PhD from Clark University and has had broad experience with the AEC in the management of nuclear materials and in contractual research and development with Quantum, Inc. Since 1960, he has been Director of the Western New York Nuclear Research Center. John MacPhee joined AMF Atomics in 1955 and has since directed several research reactor development programs. He is a graduate of RPI (1952) and of ORSORT (1954).

EMBRITTLEMENT OF HASTELLOY N

Elevated-temperature irradiation embrittlement of Hastelloy N greatly reduces the stress-rupture strength as measured in postirradiation uniaxial stress tests in this research on creep ductilities in the irradiated alloy. Intergranular cracks, once formed, propagate with greater ease in the irradiated alloy than in a sample exposed to a lesser radiation dose.

W. R. Martin (shown on left) is Group Leader, Materials Processing Group, in the Metals and Ceramics Division at the Oak Ridge National Laboratory, and is engaged in research on effects of irradiation on the creep and short-time tensile properties of iron-base alloys. J. R. Weir is the Supervisor of the Mechanical Properties Group, and is associated with research on the mechanical properties of cladding and structural materials, including radiation effects.

NUCLEAR ROCKET ANALYSIS



This article describes a detailed nuclear analysis of a gaseous-core nuclear rocket engine in which the spatial effect of the cavity liner material, coolant tubes, and structural components, as well as neutron streaming out of propellant inlet and outlet nozzle passages, are considered. Significant results of this study are that extremely high fuel loadings are required for a propulsion reactor; that substantial preheating of the reflector will be required for startup; and that ^{233}U has significant advantages over ^{235}U and ^{239}Pu as fuel in a gaseous-core nuclear rocket.

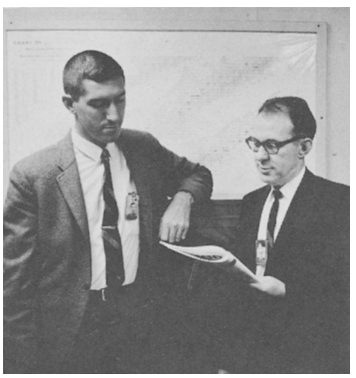
Thomas F. Plunkett (MSNE, 1962, University of Wisconsin) joined the Nuclear Department of Douglas Aircraft Corp. in 1962. His initial efforts there were in the areas of gaseous-core nuclear rocket propulsion and thermionic-reactor space power plants. More recently, his interests have been in the areas of isotope and reactor power system design and integration into manned space vehicles.

Se DETERMINATION BY PULSED ACTIVATION

This work makes use of the improvement in sensitivity in neutron activation producing the ^{77m}Se nuclide in aminoacids when the sample is activated by reactor pulses. Neutron pulses from a TRIGA Mark II reactor were used. Actual biological samples were simulated by adding ppm amounts of sodium selenite to one-gram amounts of glycine.

Vera Maxia received her PhD in chemistry from the University of her native Cagliari (Sardinia). Following the "Libera Docenza" in radiochemistry and a postgraduate year at Lawrence Radiation Laboratory, she joined the Radiochemical Laboratory of the University of Pavia, Italy, where she is Assistant Professor of Nuclear Chemistry. Mario A. Rollier, now head of the Institute of General Chemistry at the University of Pavia, is also Professor of General and Inorganic Chemistry and has been instrumental in the establishment of the Laboratorio Energia Nucleare Applicata (LENA).

NEUTRON SPECTRA FROM ACTIVATIONS



This paper describes a method of determining slow-neutron spectra from foil activation. Two sets of activants are irradiated; one set is composed of nuclides each of which has only one predominant resonance in the few-electron-volt region (resonance set); the other is composed of nuclides which, as a group, present a variety of absorption cross sections for neutrons in the subcadmium energy range (subcadmium set). The activation method has been applied in two reactor cores. The predicted spectra are compared with corresponding spectra calculated by SWAK and SWAKRAUM. There is reasonably good agreement between the spectra predicted by experiment and calculation.

Richard Fulmer (shown on left) joined the Knolls Atomic Power Laboratory in 1964 after receiving his PhD in nuclear physics from the University of Pittsburgh. His work as an experimental physicist has been primarily in the development of experimental techniques for application to reactor design. Thomas Ruane, at KAPL since 1954, obtained his PhD in nuclear physics from Notre Dame University. Presently manager of an Experimental Physics Group, he has worked in both experimental and analytical nuclear reactor design.