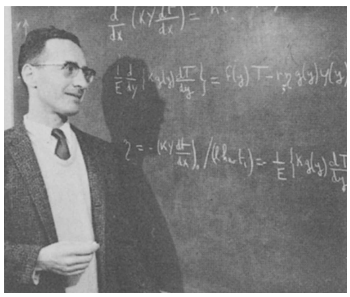
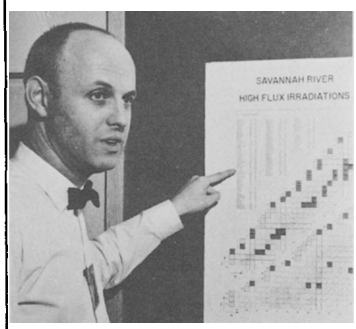
AUTHORS AND PAPERS



CHOICE OF GAS COOLANT

This paper presents two relationships that allow comparison of reactor power output and channel dimensions for different coolant gases and various operating conditions. For the same maximum surface temperature of the fuel elements, the thermodynamic performance of coolant gases is compared for given pressures and temperatures. Except for steam, the relative merit of gases is found to depend more on temperature than on pressure.

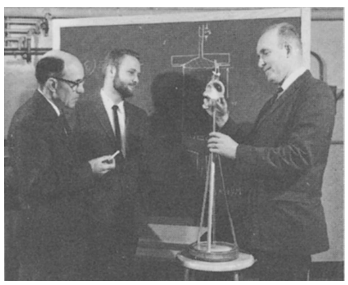
From 1954 to 1957, Gil Melese was responsible for the thermal design of the French gas-cooled power reactors. In 1960, after four years teaching Nuclear Engineering at Columbia University, he joined General Atomic where he is working on advanced reactor concepts. His PhD in Fluid Mechanics is from Johns Hopkins University (1954).



IN-SITU REPAIRS IN THE HWCTR

When it became necessary to make repairs inside the pressure vessel of the Heavy Water Components Test Reactor (HWCTR) after nearly two years of operation, careful planning and detailed work procedures allowed personnel entry into the vessel without removal of irradiated fuel from the core. Work was completed in about three weeks; radiation exposures were all within allowable limits.

Peter L. Gray is a member of the Reactor Technology Staff at Savannah River where he is responsible for special high-flux irradiations. He was the US liaison representative at the startup of the NPD in Canada, and participated in the startup and operation of the Savannah River reactors.



STABILITY OF FUEL BEDS

Randomly-packed beds of the type contemplated for the Settled Bed Fast Reactor have been found to possess adequate solid fraction stability when shock tested. In addition, the solid fraction reproducibility following the contemplated SBFR refueling procedure is acceptable.

The authors have investigated solid fraction stability and thermal characteristics of packed beds and particle mobility within fluidized beds as a part of the Settled Bed Fast Reactor program at BNL. R. J. Parsick (center) worked at Bettis Atomic Power Laboratory on the thermal, hydraulic, and mechanical design of the nuclear reactors for the aircraft carrier Enterprise and the cruiser Longbeach, from conceptual design through the sea trials. S. C. Jones (right) worked at Texaco's Port Arthur Research Center on the successful commercialization of a petroleum refining process which utilized a packed catalyst bed. L. P. Hatch is a group leader in the Nuclear Engineering Department and has had extensive experience with both packed and fluidized bed systems.

AUTOMATIC FLOW BALANCING DEVICE

A prototype device to control the exit steam quality in individual fuel element assemblies of a boiling water reactor was designed, constructed, and tested at simulated reactor operating conditions. The device, completely self-contained within one channel of the reactor, held the discharge volume quality to ± 6% of the design value during transients in the heat transfer rate of up to 25%.

D. A. Gall, Project Director, is presently an Assistant Professor in the Department of Mechanical Engineering at the Carnegie Institute of Technology. E. F. Doyle worked on the early prototype development and supervised much of the design, construction, and testing of the device. J. G. Bourne was responsible for the later work in heat transfer and two-phase flow and is in charge of the heat transfer studies for the current work.

FUEL HANDLING PROTOTYPE

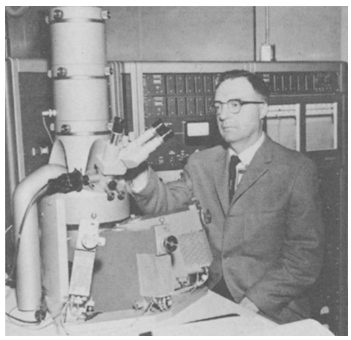
A pantograph device is the key portion of this fuel-handling machine from Italy. Indexing and latching operations are remotely controlled. The machine has been satisfactorily tested in an operating plant. Its design demonstrates a different approach to an old problem.

Giuseppe Di Chirico (left) is a 1960 graduate (ME) of Naples University. He has worked at the Ispra Nuclear Center and at the Casaccia Nuclear Center, where he has been involved in the mechanical testing of components for the Organic Reactor Prototype (PRO). Elio Merli, as chief of the PRO design office, was responsible for the mechanical design of the prototype. He completed his course requirements for a doctorate in nuclear engineering at Rome University in 1958.

OZONE FOR WATER TREATMENT

This conceptual paper evaluates the potential uses of ozone for drinking water purification and pollution control. Chemonuclear reactors are assumed for the ozone production.

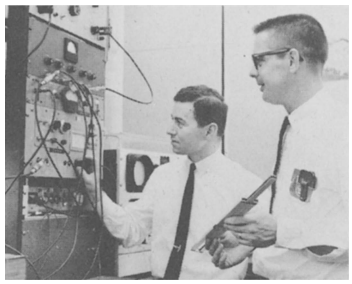
The authors are members of the Radiation Process Development Section of the BNL Nuclear Engineering Department. Morris Beller (left) has been involved in process and plant design and evaluation of industrial chemical processes for ten years, four of these at BNL. Meyer Steinberg, supervisor of the section, has been particularly active in the advancement of chemonuclear concepts, with special interest in the fixation of nitrogen and ethylene polymerization using nuclear energy.



MICROPROBE STUDIES OF FUEL MATERIALS

Chemical reactions and diffusion in a number of fuel materials were studied with the electron microprobe analyzer, which disclosed that, during manufacture, UN fuel particles underwent complete chemical reaction with the aluminum matrix in which they were imbedded. The U_3Si and UC fuel particles showed partial chemical reaction with the matrix; the reaction was completed by subsequent heating. Diffusion was observed across the boundaries in UO_2-ZrO_2 couples after exposure to elevated temperatures.

William F. Zelezny has been with the Atomic Energy Division of Phillips Petroleum Company for the past eight years. Currently he is head of the Physical Metallurgy Group and is engaged in the application of the microprobe to the study of nuclear fuel materials. He holds an MS in Metallurgy from the Montana School of Mines and a PhD in Physical Chemistry from the State University of Iowa.



SiC NEUTRON DETECTORS

The use of a layer of ^{235}U as a neutron-conversion coating over the sensitive surface of a shallow junction silicon carbide diode was tested in a reactor environment. The SiC neutron detectors show promising potential as flux-mapping devices; alpha particle counting capabilities have been demonstrated to temperatures above 700°C and with integrated neutron fluxes greater than 6×10^{15} n/cm^2.

R. R. Ferber (left) joined Westinghouse in 1958 as a Research Engineer at the Radiation and Nucleonics Laboratory, where his work has been on radiation effects on semiconductors, new radiation detection techniques, and analysis of the space radiation environment. G. N. Hamilton is an experimental physicist at the Westinghouse Reactor Evaluation Center. His interests have been primarily the design, performance, and analysis of critical experiments associated with reactor core design and development.

NEUTRON IMAGE STORAGE

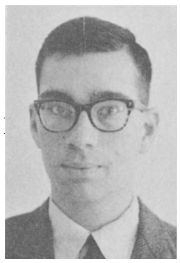
A sheet of ^6LiF, exposed to a radiographic beam of thermal neutrons, can be made to reproduce the image by means of the light emission produced by heating at any time after exposure. The storage capability of this method makes it attractive for use with relatively low intensity beams.

Jacob Kastner, Harold Berger, and I. R. Kraska (left to right) are associated with ANL. Kastner, a member of the Radiological Physics Division, is involved in the development of thermoluminescent techniques for dosimetry applications. Berger and Kraska are with the Metallurgy Division and are involved with the development of nondestructive testing techniques, including neutron radiography.

INERT ATMOSPHERE CELL

This work relates the operating experience with the shielded high-purity argon inert atmosphere cell associated with the Fuel Cycle Facility of the EBR-II complex. Since August 1963, the cell has been filled with argon twice. Each fill required approximately 100 000 standard cubic feet of argon to reduce the oxygen concentration to 1% or less. Subsequent operation of the gas purification system reduced oxygen impurities to 8 ppm with water content of 5 ppm.

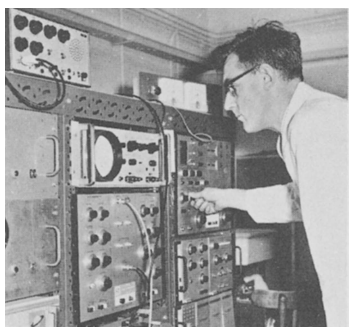
L. F. Coleman, W. F. Holcomb, and D. M. Paige (left to right) have been associated with ANL's Fuel Cycle Facility Inert Atmosphere Hot Cell since its construction. Coleman, who is an Associate Chemical Engineer at ANL, was instrumental in the design of many of the components for the inert cell operation. Paige, an Associate Chemical Engineer, and Holcomb, an Assistant Chemical engineer, both with the Idaho Division of ANL, are responsible for the operation and purity control of the cell's inert atmosphere.



55.4-SEC DELAYED NEUTRON ACTIVITY

The major contributor to the 55-sec delayed-neutron activity in ^{235}U thermal-neutron fission products is shown to be ^{87}Br by two experiments. An upper limit of 0.5% has been set on the possible contribution to the total 55-sec delayed-neutron activities by unknown precursors with half life of the order of 55-sec or longer. The half life of ^{87}Br was found to be 55.4 ± 0.7 sec.

Evan T. Williams is presently at Brooklyn College after two years as research fellow at the Danish Atomic Energy Laboratory at Risö. He received his doctorate from Massachusetts Institute of Technology, where he studied the high energy radiations from short-lived bromine isotopes. Charles D. Coryell has had a distinguished career in the field of nuclear chemistry that spans 24 years and began with the Manhattan Project at Chicago and Oak Ridge. He has been a Professor at Massachusetts Institute of Technology since 1946 and is a recognized authority on the fission process and fission products.



SODIUM ELIMINATION

An anion exchange method for the removal of sodium from biological samples is described in this work. The operations are performed in one test tube, which also serves as a sample holder for subsequent gamma-ray analysis. The method was used to reduce sodium quantities to less than 10^{-6} times the original amounts in samples in which ^{64}Cu was counted without detectable losses.

N. Spronk is currently engaged in studies of trace element composition and physiology in aquatic snails in the Zoological Laboratory of the Free University, Amsterdam, The Reactor Centre Netherlands, Petten, and the Reactor Institute, Delft, Holland. He has visited the United States on several occasions and has worked at ORNL and Cornell University.