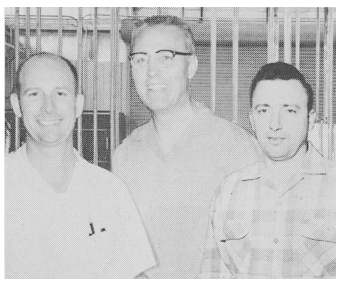
AUTHORS AND PAPERS

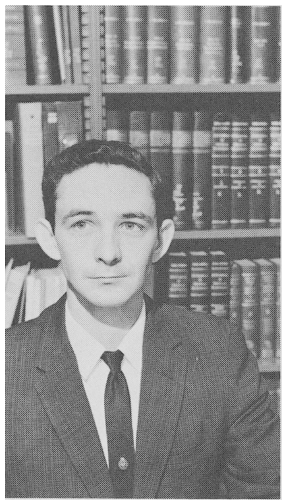
The highly condensed summaries of papers and technical notes (below) are intended to assist the busy reader in determining the order in which to read the technical material. Biographical comments are for human interest.



BORAX-V OPERATING EXPERIENCE

Operating experience with BORAX V is summarized. Areas of particular interest and investigation include: comparison of a centrally- versus a peripherally-located superheater core; superheater startup and shutdown cooling problems; superheater flooding reactivity worth and inadvertant flooding hazard; control of power split between the boiler and superheater zones of the core; superheater fuel-cladding integrity; plant radioactivity levels; results of operation with defective fuel in both areas of the core; in-core instrumentation and data collection; transfer functions and physics experiments; and the water chemistry program.

Shown left to right are R. E. Rice, BORAX-V *Project Manager, W. R. Wallin, Operations Manager, and J. D. Cerchione, Assistant Operations Manager. Rice was active in the early Naval Reactor Development Program. He participated in the design of the* ZPR-III *reactor and was Project Engineer of the* AFSR *and* EBR-I, MARK-III *reactors. Wallin was very active in operation of boiling-water reactors* BORAX-III, BORAX IV, *and* ALPR, *where he supervised the initial operational startup. Cerchione participated in operation of the* BORAX-IV *and* ALPR *reactors. Wallin is presently on a two-year leave of absence in Sweden where he is participating in the Swedish boiling-water reactor program; Rice and Cerchione are involved in the Argonne Fast Reactor Development Program.*



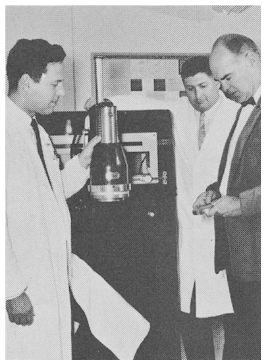
PERFORMANCE OF MILD STEEL IN HWCTR

The performance of mild steel was excellent during the three-year operation of the Heavy Water Components Test Reactor (HWCTR). Surfaces were covered uniformly with an adherent film of black oxide, and no significant pitting occurred. The D_2O purification system operated satisfactorily without a prefilter, and no problems occurred because of particulate matter in the D_2O.

J. Malvyn McKibben was responsible for the chemistry and corrosion programs at the HWCTR *throughout the term of the program. Prior to that time, he participated in studies of reactor chemistry and corrosion in other facilities at Savannah River. His BS from Emory University is in chemistry (1955).*

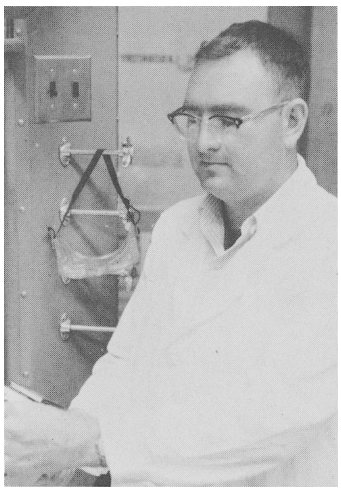
COLLOIDAL ^{99m}Tc

The physical characteristics of ^{99m}Tc, including a short half-life of six hours and a nearly monochromatic gamma emission of 140 keV, make it an excellent agent for scintillation scanning. A colloid of this isotope, prepared by passing hydrogen sulfide through a solution of 1 *N* HCl containing pertechnetate, is used for scanning liver, spleen, and bone marrow. A specially designed collimator, with greater sensitivity than commercially available types, is described.



The authors are in the Medical and Nuclear Engineering Departments of Brookhaven National Laboratory. Harold Atkins (left) received his radiology training at the hospital of the University of Pennsylvania and practiced radiotherapy and nuclear medicine at Yale University School of Medicine and Columbia University College of Physicians and Surgeons. Since 1963, he has been at BNL, where his main interests are medical isotope-scanning techniques, neutron radiography, and neutron-capture therapy. His MD (1952) is from Harvard Medical School. Lewis Schiffer (center) received his MD (1955) from State University of New York, Upstate Medical Center, where he spent his residency and was a Research Fellow in Hematology. In 1961, he came to BNL where his main interests are hematology, extracorporeal irradiation of blood, and iron and vitamin-B_{12} metabolism. Powell Richards has been involved in nuclear work since 1944, first in the Manhattan Project at Oak Ridge and Hanford, and since 1948, in the Nuclear Engineering Department at BNL. In recent years, he has been primarily interested in the development and production of radioisotopes and their application to nuclear medicine and has been instrumental in the introduction of ^{99m}Tc to the field.

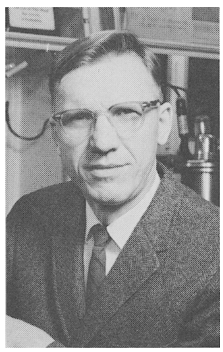
^{198}Au LOW IN ^{199}Au



The epithermal neutron capture by ^{197}Au has been used to produce ^{198}Au with a specific activity of 370 Ci/g. The ^{199}Au content of the sample, produced by the secondary thermal-neutron-capture reaction, was reduced to $< 0.1\%$ by enclosing the samples in cadmium capsules before irradiation.

R. E. Lewis is a member of the Isotopes Development Department, Isotopes Development Center, ORNL, where he has been working primarily on preparation of radioisotopes since 1963. Prior to that time, his work was in the recovery and purification of long-lived fission products for radiation and heat sources. He obtained his BS in chemistry in 1959 from Oklahoma State University.

THERMIONIC CONVERTER USING LIQUID METAL

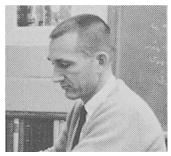


Liquid metals can be used as electron collectors in energy-conversion diodes. In such applications, the collector is separated from the emitter by the vapor film produced in film boiling. Such a vapor film would maintain electrical separation, if the emitter became warped due to radiation damage, thus greatly improving the reliability of an in-core thermionic diode.

A. J. Ulrich came to Argonne National Laboratory in 1950, where he has been engaged in measurement of in-pile electrical resistance of insulators and critical experiments for the Submarine Thermal Reactor, BORAX *transient analysis, thermonuclear studies, thermionic experiments, and advanced concept evaluation. He worked at Clinton Laboratories before attending the University of Chicago, where he obtained his MS in physics in 1950.*

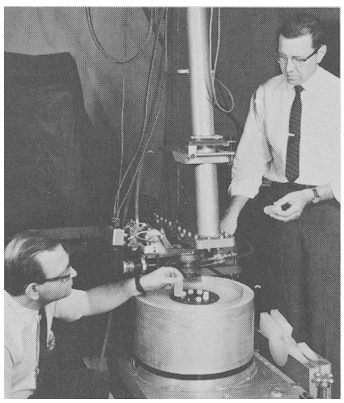
FERROELECTRIC RADIATION DETECTORS

Experimental observations point to the pyroelectric effect as the source of charge release from radiation detectors fabricated from poled ceramic lead zirconate titanate (LZT) ferroelectric materials. A theoretical derivation using the theory of pyroelectricity is verified by the previously published data and by an especially designed experiment where the normalized charge release as a function of temperature is compared with normalized pyroelectric coefficient data.



D. L. Hester (right) and D. D. Glower have been investigating radiation damage effects in ferroelectric materials and have published several articles concerned with the fundamental aspects of this research. The radiation detector is an interesting application of the observed phenomena. Hester is currently the James B. Duke Fellow in Electrical Engineering at Duke University, Durham, North Carolina. Glower is Chairman of the Nuclear Engineering Advisory Committee at Ohio State University, Columbus, Ohio, where he is responsible for graduate student activities in nuclear engineering.

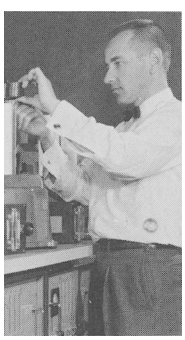
ACTIVATION ANALYSIS FOR CHLORINE



A photoneutron source of improved design, with a larger and more uniform thermal-neutron flux than designs previously described, permits the instrumental analysis for chlorine to 0.05 ppm with good accuracy and reproducibility. The satisfactory analysis of more than 1200 samples by the method has proved its suitability for routine use by technicians.

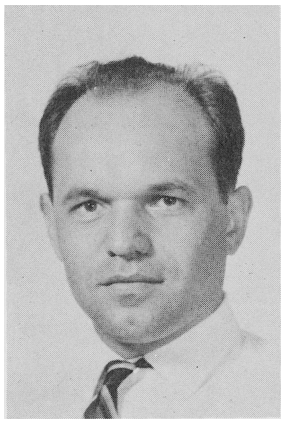
Herbert Braier (left) has specialized in activation analysis and radiotracer applications since joining the Gulf Research and Development Company in 1960. Before coming to the United States, he was associated with the Argentina Atomic Energy Commission. His PhD in chemistry is from La Plata University, Argentina. William E. Mott has been Supervisor of the Nuclear Applications Section at Gulf Research and Development Company since 1955. His major interests are activation analysis, radioisotope applications, and nuclear geophysics. His PhD (nuclear physics, 1953) is from Carnegie Institute of Technology.

BORON ASSAY IN STAINLESS STEEL



This work describes a technique for measuring the boron inventory of two different borated stainless steels by means of a sensitively instrumented subcritical test assembly. The results compare favorably with those obtained by monochromatic neutron-transmission measurements and with classical chemical analyses.

Henry L. Bermanis joined the General Electric Company in 1955 as a nuclear measurements specialist with the Aircraft Nuclear Propulsion program. Since 1961, he has performed reactor-theory experiment correlation and reactor-systems safety studies for the 630A Nuclear Steam Generator and for the 710 fast-spectrum refractory-metals reactor project. His BS in physics/mathematics is from the University of Cincinnati.

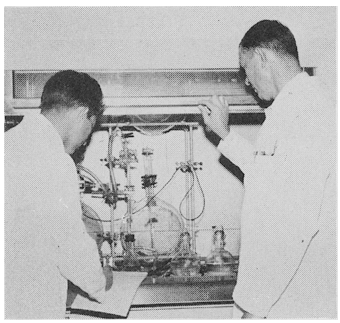


ISOTOPE EFFECTS ACCOMPANYING OXIDATION

This work describes a simple apparatus used for the separation of the components of a mixture of CO, H_2, and CH_4. The separation of CO and CH_4 by selective oxidation with CuO was studied with $^{14}CH_4$. The ^{13}C isotope fractionation, during oxidation of CO with I_2O_5 and with CuO and during the elevated temperature oxidation of CH_4 with CuO, and the tritium fraction, during the oxidation of tritiated hydrogen, are also reported.

Mieczysław Zieliński is presently doing research in isotope chemistry and teaching nuclear chemistry at the University of Warsaw, Poland. During 1964, he did postdoctoral studies on ^{13}C and ^{18}O isotope effects in chemical reactions at the Universities of Illinois and Chicago. His MS in radiochemistry and emission spectroscopy is from the University of Gorkii, USSR (1956), and his PhD in isotope chemistry and nuclear chemistry is from the University of Warsaw, Poland (1961).

SAMPLING CARBON-BOUND RADIOIODINE



Conventional air-sampling techniques have been adapted to include the quantitative collection of iodine from airborne carbon-iodine bonded compounds. A high-frequency electric spark is used to rupture the organic bond, and the resulting ionic and molecular forms of iodine are sorbed on an ion-exchange resin.

Earl L. Whittaker and Erich Bretthauer are with the Southwestern Radiological Health Laboratory. Whittaker (shown on right) has had 12 years experience in analytical chemistry programs, both stable and radiochemical. Since 1961, he has been doing research in air-sampling techniques and neutron activation analysis. His BS in chemistry is from Northwestern University. Bretthauer spent three years as a research chemist for the Agricultural Experiment Station of the University of Nevada, after receiving his MS in chemistry from the University in 1962.