

August 31, 1972

Donald I. Walker, Director
Health Services Laboratory

MONTHLY ACTIVITY REPORT - ANALYTICAL CHEMISTRY BRANCH
July 20, 1972 - August 20, 1972

ROUTINE

Biological Samples (veg., milk, urine, oysters, fish)	16
Water Samples (potable, effluent, etc.)	79
Air Dusts Samples (filters, smears, etc.)	155
Soil, Dirt and Sediments Samples	11
Gas Samples	1
Miscellaneous Samples	1
Whole-Body Counts	45

Regulatory Work

Program and Media	Alpha	Beta	³ H	⁸⁹ Sr	⁹⁰ Sr	Gamma Scan
Current State Contract Program						
Liquid	6	6	6	6	6	6
Gas						1
Anticipated Airborne Effluents						
Halogens						1

RESEARCH AND PROJECTS

Research continued on the procedures for calcium-45 and the analysis of soils for plutonium. A method was devised to completely dissolve residue obtained from the developmental work on the evaporator-concentrator. Spiked soils and water samples were run through the cerium hydroxide procedure and data were collected for the efficiency of recovery and spectral resolution of the procedure. Work was started on the separation procedure for fission and activation products using cation exchange resins and various eluants. The procedures for promethium-147, iron-55 and iron-59, and nickel-63 were written for intralaboratory use. The distribution of actinium-228 was determined through the actinium portion of the radium, thorium, and actinium procedure for solid samples. A procedure was developed for the analysis of sulfur-35 in reactor water. A detection limit for iodine-129 in milk of 0.02 picocuries per liter was determined by spiking a milk sample.

REPOSITORY

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A study was undertaken to compare the various methods for strontium-89 and strontium-90 analyses with the one utilizing liquid scintillation. Ion exchange is being studied as a method of separating barium from strontium. Research was continued on the development of rapid methods for the determination of strontium-90 in milk and soil.

A prior treatment of standards and strips involving fusion with one gram of sodium sulfate before electrodeposition gave yields of 95 to >98% on all actinides from thorium through californium. Some special problems were encountered with neptunium-237 as the fusion probably stabilizes neptunium in the neptunium(V) state, which has the most soluble hydroxide and is the least depositable. Oxidation to neptunium(VI) gave approximately 98% deposition yields but only inconsistently. Reduction of neptunium to neptunium(IV) with sodium metabisulfite has consistently given deposition of 94 to 97%. Currently, protactinium-231 is giving some problems by hydrolyzing on the electrodeposition equipment, even in the presence of sulfate. To stop these losses, hydrogen fluoride will be added to the deposition and the subsequent cleanup. The reagents used in electrodeposition were analyzed to determine if they were sources of contamination. A relatively small amount of thoron daughter contamination was found.

Trial analyses of ten biological samples by neutron activation were begun. Different fractions from the chemical separations are being counted and the counting data are processed by the 360 computer. The purpose is to determine the optimum time for counting and the extent of chemical separation of the radionuclides that is necessary before counting. The calibration of the Ge(Li) detector for the activation analysis study was completed. Three different efficiency curves were obtained from the calibrations. The linearity of the ND analyzer was determined and curves were plotted for converting channel number values to gamma energies. Spiked salts were prepared for determining efficiency factors for the Ge(Li) detector. A table of Ge(Li) efficiency factors for fission products and a table of nuclides found in fission products as a function of age were prepared. A cesium-137 source was used for a recalibration of the whole-body counter using "Herbie" as the subject. The calibration of the whole-body counter for the determination of in vivo uranium was completed.

The electrodeposition unit was completed. The construction and check-out of the film calibrator was completed. The calibrator was installed and is now in use. Work was started on the samplers for the Environmental Sciences Branch. Rollers for the master file table were modified. A defective 6DQ6 tube and resistor in the Tektronix RM 503 oscilloscope were

replaced. A defective bearing in the blood sample unit for the dispensary and the preamplifier in Vault 3B were repaired. An open transistor had to be replaced in the 50/50 system because the 2⁵ data list could not be set to a one. The commutator was cleaned and the transistors in the teletype accessory box were replaced on the teletype for the wide beta counter. Lamps were replaced in the Beckman liquid scintillation system and the BA Model 530 spectrometer, and a poor connection in the Nuclear Data 4096 analyzer which prevented the analyze, stop, and readout lamps from turning on was corrected. The speaker system in the conference room was changed. Springs and hooks were built for the liquid nitrogen dewar. The low beta unit would not advance past sample No. 1, and the control logic problem was corrected to remedy this. The factory-repaired Tally Model 420 perforator was installed and checked out. Work was done with Jim Turpin, Aerojet Nuclear Company, to correct the problem in the liquid scintillation system teletype. Two shorted transistors were replaced in the preamplifier for the whole-body counting system.

SPECIAL ACTIVITIES

Claude W. Sill attended the meeting of the task group for the Office of Water Data Coordination in Denver on July 25 through 29.

A Regional Coordinators meeting was held July 24. A whole-body counting seminar was held at the Health Services Laboratory July 25 through 26 with members of the Directorate of Regulatory Operations from both Headquarters and Regional Offices attending.

John P. Cusimano, Dosimetry Branch, discussed motorcycle safety precautions and the movie "Ten Long Minutes" was shown at the Branch safety meeting on August 15.

Claude W. Sill has been asked to present his paper "Preparation and Testing of Standard Soils Containing Known Quantities of Radionuclides" at the 18th Annual Conference on Bioassay, Environmental and Analytical Chemistry.

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DATE ▶	8/31/72					