February 29, 1972

Donald I. Walker, Director
Health Services Laboratory

MONTHLY ACTIVITY REPORT - ANALYTICAL CHEMISTRY BRANCH
January 20, 1972 - February 20, 1972

ROUTINE

Biological Samples (veg., milk, urine, oysters, fish)	17
Water Samples (potable, effluent, etc.)	84
Air Dusts Samples (filters, smears, etc.)	357
Soil, Dirt and Sediments Samples	42
Gas Samples	4
Miscellaneous Samples	92
Whole-Body Counts	74

Regulatory Work

Program and Media	Alpha	Beta	^{3}H	^{89}Sr	^{90}Sr	Gamma Spec	^{131}I
Current State Contract Program							
Liquid		4	4	2	2	4	
Gas						2	
Anticipated State Contract Program and/or PI 3300							
Gas						2	2
Oyster Creek Evaluation							
Preliminary liquid waste system evaluation	6		6	6	6	6	

RESEARCH

As the result of a ruptured fuel element at ZPPR, 18 people were given whole-body counts and 76 smears were run to determine the amount of ^{239}Pu present. The results of the whole-body counts for all 18 people were less than one lung burden of ^{239}Pu.

Hydrated MnO_2 was prepared and research was done on its carrying properties. The search for information concerning the large volume sampler-concentrator problem continued. In the $Ce(OH)_4$ procedure for the deposition of gross alpha emitters, uranium is still not compatible with

the other alpha emitters for the gross determination. Research is still being conducted on leaching large amounts of soil and on solid decomposition for natural uranium using an acid digestion bomb. A literature search is being conducted for information concerning the analysis of large volume (1000 to 2000 liters) water samples. In the project on the separation of lanthanides from actinides, conditions were found in which the ^{241}Am recovery is 92% and the ^{144}Ce recovery is only 0.5% using an anion column and NH_4SCN as eluant.

The electrodeposition thorium yield in soil analysis has been increased to >98% by incorporating a pyrosulfate fusion before the electrodeposition step to dissolve any hydrolyzed thorium. Further studies were made to improve the electrodeposition yield of plutonium in soil. Additional research was done on uniform electrodeposition, and a new spiral anode was fabricated.

Preliminary work was started on the development of a gross beta method by liquid scintillation. Spectra were collected for the various common isotopes found in fission-product samples. These included low energy beta emitters, higher energy beta emitters, pure gamma emitters, and beta-gamma emitters. These spectra will help establish the optimum instrument parameters and figure-of-merit values.

The procedure of Mercer, Burton, Gunn, and Black for the direct extraction of yttrium in milk is being adapted for use in this laboratory. The procedure for strontium determination in soils is being adapted for both the analysis of strontium in air dust filters and for the determination of ^{90}Sr in water.

To determine the amount of carbon left and the time of decomposition, 500-gram samples of wheat were decomposed by dry-ashing, 200-gram samples of wheat were decomposed by hydrogen peroxide--ferrous iron, and 100-gram samples of wheat were decomposed by the sulfuric acid--nitric acid method. Dry-ashing takes the most time; but if the temperature of the oven is less than 530° C, no corrosion of the dish occurs, and large samples can be accommodated. The hydrogen peroxide method works well but must be followed by sulfuric acid--nitric acid decomposition to remove the last of the organic matter. Several tests were made on the deposition of activity on a filter paper to determine if it can be evenly spread over the face of the filter. As yet, the activity is still not evenly distributed.

Helical scanning was used to trace ^{141}Ce, ^{51}Cr, and ^{85}Sr in the human body. Forty sets of the counting data have been processed by the computer to show the differences in the locations of these three nuclides in the body.

A program library has been prepared on tape to facilitate rapid retrieval of desired programs. A cold air trap for use in the vacuum system of the alpha spectrometers has been designed. This trap makes it possible to run three-day counts (weekends) and makes it no longer necessary to fill the small drum daily. There has apparently been a change in the drift depth in the Ge(Li) detector since the last time it was calibrated. This necessitates that the detector be recalibrated. Standard solutions from 10-90 ml and 400 ml were prepared to be used in this recalibration and to be reused in the future to check calibration and/or to recalibrate the detector should another change occur.

SPECIAL ACTIVITIES

The paper entitled "Electrodeposition of Alpha-Emitting Nuclides from a Mixed Oxalate--Chloride Electrolyte" by K. W. Puphal and D. R. Olsen was published in the February issue of ANALYTICAL CHEMISTRY.

A movie on automotive safety entitled "In the Crash" was shown at the Branch safety meeting on February 8, 1972.

J. I. Anderson and D. G. Olson's paper entitled "Computerized Helical Scanning to Determine the Location of Specific Nuclides in the Human Body" was accepted for publication in HEALTH PHYSICS.

Claude W. Sill, Chief
Analytical Chemistry Branch
Health Services Laboratory

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OFFICE ▶	HSLAC					
SURNAME ▶	CWSill:cao					
DATE ▶	3/1/72					

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