Donald I. Walker, Director
Health Services Laboratory

MONTHLY ACTIVITY REPORT - ANALYTICAL CHEMISTRY BRANCH
December 20, 1971 - January 20, 1972

ROUTINE

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|---|---|
| Biological Samples (veg., milk, urine, oysters, fish) | 14 |
| Water Samples (potable, effluent, etc.) | 115 |
| Air Dusts Samples (filters, smears, etc.) | 141 |
| Soil, Dirt and Sediments Samples | 10 |
| Gas Samples | 4 |
| Whole Body Counts | 19 |

Regulatory Work

| Program & Media | Alpha | Beta | Gamma | $^{3}H$ | $^{89}Sr$ | $^{90}Sr$ | Gamma Spec. | Alpha Spec. |
|---|---|---|---|---|---|---|---|---|
| Current State Contract Program | | | | | | | | |
| Liquid | 2 | 6 | | 4 | 6 | 6 | 6 | |
| Gas | | | | | | | 2 | |
| NFS(Erwin) Environmental Measurements | | | | | | | | |
| Particulates | 23 | 23 | | | | | | |
| Liquids | | 7 | 7 | 7 | | | 7 | 7 |
| Sediments | 9 | 7 | 7 | 7 | | | 7 | 9 |

RESEARCH

As the result of a human exposure at TRA, the first whole body count of the individual showed 0.4 µCi $^{137}Cs$, 0.25 µCi $^{134}Cs$ and 0.07 µCi $^{60}Co$. About 50% of the activity was eliminated from the body in the first 24 hours. An investigation was started on the possibility of using a 5-inch by 1-mm NaI(Tl) detector for in vivo plutonium counting. The echoencephaloscope was received and will be used to measure chest-wall thickness. Preliminary work has been done to prepare for another human

studies trial to evaluate the improved helical whole-body counting technique.

The development of a capability to do freeze-drying of many more types of material is continuing. Sea food concentrates, milk, lung tissue, grass and human feces have been dried successfully.

A burner was prepared for decomposing large samples of vegetation for $^{129}I$ determination. The equipment needs some alteration before it will burn large samples, but the idea looks good. Large samples of meat were decomposed using hydrogen peroxide and ferrous iron in preparation for decomposing a human lung for plutonium determination. The procedure looks like it will work well.

The $^{90}Sr$-$^{89}Sr$ results obtained by the liquid scintillation method were compared to the results obtained by the conventional method on samples from various reactors around the country. Thus far, the results indicate that the liquid scintillation method compares favorably with the conventional method.

A study was carried out on pure tracer solution and soil samples to see if excessive heating of a $Na_2SO_4$ media has any detrimental effect on subsequent electrodeposition of the alpha emitters present in the systems. Results of six individual trials all indicated that the $^{239}Pu$ and $^{236}Pu$ tracers remained in an ionic form susceptible to electrodeposition even after an extreme heat treatment over a blast lamp. It appears that the plutoniums were not converted to the oxides in the presence of the sulfate ions.

The uniform electrodeposition research was continued using a "G"-shaped anode and a spiral-shaped anode. Deposition appearance and autoradiograms indicate good uniformity of deposit when either of these two anodes is used. New beveled teflon spacers were obtained from Paul Boren to reduce the chance of electrolyte leakage during electrodeposition.

The problem experienced in electrodepositing the plutonium fraction in the analysis of soil has been traced to the failure to dissolve completely the $NaHSO_4$ form of the sample and/or failure to chelate the small amount of $Al^{+3}$ that comes through into the plutonium fraction. The deposition yields have increased to >99% in the case of plutonium-spiked soil blanks when the $NaHSO_4$ form has been boiled with DTPA at pH 7 for about 15 minutes prior to the deposition. This tends to dissolve impurities as well as chelate any $Al^{+3}$ with the DTPA.

The calcium interference studies on the total decomposition procedure for $^{90}Sr$ in soil were completed. The $BaCrO_4$ separation of $^{140}Ba$ was studied for a total strontium procedure.

Research done on total sample decomposition in the digestion bomb was applied to $^{nat}U$ determination. Work continues on the wet-ashing of green bone for $^{210}Po$ determination and on the analysis of soils for plutonium. The literature survey for information pertinent to large-volume water sampler-concentrator was continued and experiments were conducted on evaporation methods. Work is being done on the separation of tervalent actinides from tervalent lanthanides by use of the thiocyanate complex on an anion resin.

SPECIAL ACTIVITIES

The paper entitled "Computerized Helical Scanning to Locate Radionuclides in the Human Body" by Jesse I. Anderson and Dale G. Olson has been accepted for publication in HEALTH PHYSICS.

Claude W. Sill attended a training course at ID Headquarters, January 21, 1972, entitled "Effective Listening."

A movie on fire prevention on the job entitled "Stop Fires, Save Jobs" was shown at the Branch safety meeting on January 18, 1972.

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| DATE ▶ | 1/31/72 | | | | | |