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Health Services Laboratory

ACTIVITY REPORT OF THE ENVIRONMENTAL BRANCH, OCTOBER 21 - NOVEMBER 20, 1969

WASTE MANAGEMENT

Research

Combustion furnaces have been set up and glassware fabricated for the tritium fractionation study. The furnaces are now in the process of being calibrated for temperature control.

The column study on adsorption of Cs-137 by the fine sediment of the Lost River alluvium has been completed. Approximately 6 liters of solutions were passed through 3 grams of alluvium with about 50% breakthrough.

A laboratory study on the permeability and exchange properties of the playa sediment in the vicinity of LOFT is being initiated. Laboratory apparatus for the permeability study has been set up and the stock solutions prepared for a simulated waste solution of LOFT. The experiment will begin shortly.

The equilibrium concentration of aqueous plutonium under various conditions of pH and oxidation potentials (pertinent parameters) has been calculated assuming no complexing with ions other than the hydroxyl. For a pH of about 8 and an oxidation potential of about 0.00 volts, the total equilibrium concentration of all the aqueous plutonium species is below the on-site RCG value of Pu-239. The species of aqueous plutonium contributing most under the conditions of interest are Pu^{+3} and PuO_2^+ .

The results from testing and research efforts for developing an environmental tritium sampler are being summarized.

Environmental Monitoring

The average on and off-site air concentrations of filterable gross alpha and beta radioactivity and iodine-131 for October were as follows:

	<u>Alpha</u>	<u>Beta</u>	<u>Iodine-131</u>
On-site	0.0020 pCi/m ³	0.275 pCi/m ³	<0.01 pCi/m ³
Off-site	0.0035 pCi/m ³	0.195 pCi/m ³	<0.01 pCi/m ³

All of the above concentrations were less than 34% of the CG values for uncontrolled areas.

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FILE: Environmental Science Branch
Monthly Rpt. for 1966-70

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The off-site concentrations of gross alpha radioactivity in air continued to be higher than the on-site concentrations. During October the concentrations measured in Pocatello, Blackfoot and Idaho Falls were 0.0067, 0.0033 and 0.0028 pCi/m³ respectively.

The higher gross beta concentrations on-site were probably due to releases from CPP.

A meeting was held on November 5 with members of the Idaho Department of Health for the purpose of reviewing the status of our off-site measurements of gross alpha radioactivity in air. It was decided at the meeting that we would set up two of our own samplers near the phosphate works in Pocatello and one in American Falls to serve as background. We would also calibrate the air flow for two samplers owned by the State Department of Health, so that they could use them in the Pocatello area also. It was also agreed that we would analyze all the filters for their radioactivity. At the request of Howard Burkhardt, Claude Sill also agreed to analyze some of the samples for lead.

The average concentration of particulate material in surface air on-site for October was 30.0 ug/m³ compared to 70.3 ug/m³ for off-site locations.

The average on-site ground water concentrations of gross alpha, beta and tritium activity for October were less than 1% of their respective CG values.

Fourteen Bi-annual off-site water samples were collected and analyzed for alpha, beta, and tritium activity during October. All samples showed concentrations less than 10%, 5% and 0.1% of their respective CG values.

Fourteen milk samples were collected and analyzed for Iodine-131, Cesium-137 and Strontium-90 during October. All samples showed concentrations less than 20%, 0.3% and 3.0% of their respective CG values.

Environmental Studies

The effort of the Environmental Studies Section during the reporting period are summarized below.

Controlled Environmental Release Test (CERT) Program:

- (a) Analysis of the data from CERT-25 and CERT-26 is continuing.

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Controlled Environmental Release Test (CERT) Program:(cont.)

- (b) The contract with Clifford H. Spencer and Sons for operation of the Experimental Dairy Farm (EDF) was terminated 31 October. The six dairy cows were returned to Montana State University (MSU) on 30 October; the concentration of radioiodine in a representative milk sample had fallen to 100 picocuries/liter by that date.
- (c) Plans for more studies of the effects of various variables on the transfer of gaseous radioactivity from air to grass were formulated. The first of these will be determinations of the affect of humidity on the transfer of radioiodine and of the variability of such tests.
- (d) Preparations were completed for CERT-27 and the test was executed at the EDF on 5 November. Approximately 500 mCi/ of ^{51}Cr were released in a 30-minute period using an atomization-type aerosol generator. Analysis of the data and autoradiography of air sampling media were begun.
- (e) A gamma well counter was loaned to MSU to allow Drs. Strobel and Jackson to begin work on the study of the transfer of radioiodine from air to grass surfaces with particular emphasis on study of the role of surface lipids in this process. This work is to complement our study of the influence of stomata on transfer and they will provide us with reports of their results.

Experimental Cloud Exposure Study (EXCES):

- (a) Deposition of the ^{51}Cr aerosol on the G-N tube system and on an ion chamber was evaluated as part of CERT-27. The activity deposited on the exposed tubes was less than the detection limit of 400 pCi. Additional evaluations of this problem in the CERTLE chamber are planned.
- (b) The source cask was prepared for use and the cask, pump, and spray nozzle tested together and calibrated in the laboratory. A planned field test of the entire aerosol generation mechanism was not run because of poor weather conditions and changes in the reactor shutdown schedule. A test of the mechanics of transferring a ^{24}Na source from the reactor to our source cask was successfully completed.

Independent Measurement Program (IMP):

- (a) Report Number 2 for the Nuclear Fuel Services-Erwin survey (April - June, 1969) was finalized and is ready for reproduction.

Independent Measurements Program (IMP): (cont.)

- (b) None of the special sediment samples taken from the NPS-2 plant vicinity (for the purpose of identifying the source of ^{90}Sr) contained detectable concentrations of ^{90}Sr .
- (c) Report Number 6 for the Nuclear Fuel Services-New York program was written and is being reviewed.
- (d) Report Number 1 for the Humboldt Bay survey is being written.
- (e) The IMP sampling proposal for the Mallinckrodt/Nuclear plant was accepted as written by the Division of Compliance. The first samples were collected during the week of 16 November.
- (f) A bed of MSA 85851 charcoal was found to have an average collection efficiency of 95% for Hg-203. AC-1 filters were found to have an average collection efficiency of 77%. Both averages were based on five separate runs.

Other (Routine):

- (a) The regular weekly and monthly smear and radiation surveys of AEC facilities at the NRTS were completed.
- (b) Disposal of HSL radioactive waste and laundering of anti-contamination clothing were arranged as required.
- (c) Boyd Mortensen participated in the Safety Committee inspection of HSL facilities.

Other (Non-routine):

- (a) A number of items were checked for contamination prior to release as surplus.
- (b) The new instruments for the emergency kits were received and have been placed in the kits.
- (c) Special flow rate measurements of Analytical Chemistry Branch hoods were made at the request of Claude Sill.
- (d) Samples of wheat from areas around the NRTS were ashed as part of the preparation for analysis for Sr-90.
- (e) The radiation monitor in the Emergency Relocation Center was checked and found to be operating satisfactorily.

Other (Non-routine):(cont.)

- (f) It was agreed to generate aerosols for inhalation as part of Jess Anderson's evaluations of the rotational whole body scanner (whenever he needs them).
- (g) Section members reviewed and prepared comments on ten draft copies of system design description documents for the Loss of Fluid Test Program.
- (h) A paper by Earl Markee (ESSA) on "Some Processes Affecting the Transfer of Radiiodine from Air to Vegetation," was reviewed.
- (i) A report on the Symposium on Nuclear Power and the Public held at the University of Minnesota was completed and routed to interested individuals.

Health Physics

During the routine surveys of the Laboratory for radiation and radioactive contamination six smears indicated activity above our limits of 200 d/m for beta-gamma activity and 10 d/m for alpha activity. These ranged up to approximately 38 d/m alpha and 700 d/m beta-gamma. Three were in the Source Vault, two in Laboratory 121 (hood and sink) and the other one (250 d/m β , γ) on an instrument work bench in room 173. Personnel responsible for the areas were notified for appropriate action.

The following reports were reviewed and appropriate comments transmitted.

1. Supplemental information to "PSAR on the ICFP Product Denitration Process."
2. FDD 1.2 - "Preliminary Facility Design Description for the Containment Facility."
3. FRD-1, Rev. 1, -"LOFF Facility Requirements Document."
4. SDD 1.5.5 - "Dolly Plateout Sampler System."

A 55-gal. drum containing approximately a gallon of contaminated bolts and zirconium chunks was "discovered" by Steve Henicksman of the Fire Department in the sagebrush behind the old Fire Station No. 2 Building. The source of this material is uncertain but it is believed to be leftover material from some fire tests with pyrophoric metals that were performed several years ago.

Health Physics (cont.)

About a quart of this material consists of small chunks of metal approximately 3/16" x 1/4" x 3/32". An analysis by Will Polzer by x-ray fluorescence spectroscopy indicated that it is probably zirconium. Contamination on this material is very slight, on the order of 400 d/m on each piece. A gamma spectrum indicated the activity is probably natural uranium.

The rest of the material consists of bolts approximately 3/4" diameter with various lengths up to about 3 inches. The heads, and in some cases part of the threaded portion, are covered in an irregular pattern with what appeared to be molten iron at the time of application. On top of this, also in an irregular pattern, is a layer of what appears to have been molten brass or bronze at the time of application. Very perplexing! The individual bolts indicate up to approximately 3 mrad/hr at near contact with an open-window GM. A rough calculation indicates this would be about .05 uCi. A gamma spectrum taken on one bolt indicates the activity is probably depleted uranium.

It was recommended to Steve that he send in a request for disposal to the burial ground.

U. S. Geological Survey

See attached report.

ESSA/ARLFRO - Environmental Sciences Services Administration

See attached report.

Charles A. Pelletier, Chief
Environmental Branch
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HSL

Enclosure:

- 1. USGS Report
- 2. ESSA Report

cc: John R. Horan
G. L. Voelz, M.D.

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DATE ▶	12/1/69				