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SUBS. FOLDER Activities of Environmental Branch

July 31, 1970 4/21-7/20/70
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ACTIVITIES OF THE ENVIRONMENTAL BRANCH 21 JUNE - 20 JULY 1970

Recent data on tritium fractionation indicate a lower tritium content (by a factor of ~10) in the water obtained by heating bayerite, $Al(OH)_3$, at a temperature of $900^{\circ}C$ as compared to the "free" water (water collected at a temperature of $90^{\circ}C$). Subsequent experiments indicate that this decrease cannot be accounted for by error in the procedure or the experimental system, even though the quantity of water collected at $900^{\circ}C$ is low, ~.02 to .03 grams of water. Analysis of water collected at a temperature of $600^{\circ}C$ indicate a slightly higher tritium content compared to the "free" water in some cases. This increase may or may not be real. Further work will be conducted to substantiate the above findings. Literature research will also be carried out in order to explain the above findings from a theoretical point of view.

The precipitation of aluminum hydroxide at low pH's (~4) by slow evaporation has not been successful as in the case of precipitation at high pH's (~12). The size of the crystallite of gibbsite, $Al(OH)_3$, remain so small that they cannot be taken out of solution by centrifugation. However, there is some indication that evaporation to near dryness may give the desired material needed for the study of tritium fractionation at low pH.

The problem of precipitating aluminum hydroxide from solution at low pH's was discussed (by phone) with J. D. Hem, Research Chemist, USGS in Menlo Park. He confirmed the results that the crystallites remain very small at low pH's. The availability of data on the charge density of aluminum hydroxide was also discussed. Such data may give some insight as to possible explanations for the fractionation results obtained.

An evaluation of the new proposed site for the LOFT waste storage pond is being made with respect to the ability of the soil to retain Sr-90. Soil samples were collected, mock waste solutions prepared and an experiment conducted to determine distribution coefficients. Samples from the K_d experiment are now being analyzed for Sr-85.

ICPP Waste

During the period it takes to remedy the situation of the plugged disposal well additional information will be reported for monthly discharges. A

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proportional composite sample of water from the production wells will be collected. The production well sample will be analyzed the same as that collected from the discharge liquid waste. This will allow an evaluation of the amounts of radioactivity that recirculate back to the plant waste stream. If the amounts of radioactivity recirculating are significant, then adjustment on the amounts disposed to the waste stream will be made.

The tritium air sampler using silica-gel columns has been used at ICPP in a cooperative effort between our laboratory and the INC HP people. The ICPP stack monitoring system was used for the tritium sampling. A pre-filtered air flow from the stack discharge was drawn through the silica-gel column. The Gelman low volume type sampler was modified and used to collect the CPP stack samples. This sampler is being used since it is adaptable to units for the Independent Monitoring Program. A total of four tritium samples have been collected. One of the samples had a questionable sampling period and was disregarded. The results from three other weekly samples showed tritium air concentrations from 3 to 6 x 10⁻⁹ µCi/cc with two having identical values. Special interest in sampling during the month of June and July existed since the WCF is not operating. These sample results appear very logical with operations during the sampling period. The samples collected prior to WCF startup should be useful for evaluating those collected during calcining operations.

A computer program is being written in Mark IV language to fill and report waste release data.

Controlled Environmental Release Test (CERT) Program:

- (a) The Experimental Dairy Farm (EDF) has been prepared for the cooperative metabolism study. Necessary supplies were purchased. The contract for the cows was negotiated for us by the Contracts and Support Division. No word on the status of the application for assistance from Associated Western Universities (for David Ross) has been received. The Sudangrass is now about two feet high.
- (b) Only one supplier bid on the spectral pyranometer. It was recommended that the Eppley Laboratory, Inc. be awarded the contract to supply the instrument. They are unable to provide one of the requested filters at this time; however, it is the least critical filter for our purpose, and will be available after further development work.
- (c) The hot-wire anemometer probes in the environmental chamber have been remounted to ensure that chamber vibrations are not included in the measurements of turbulence of the air stream.

Experimental Cloud Exposure Study (EXCES)

(a) Evaluations of aerosol size distribution, deposition velocity, and

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vertical concentration profile data for the Na-24 release tests were completed.

- (b) Revision of the draft EXCES hazards analysis was completed and is being reviewed.
- (c) Another evaluation of the battery-operated low-volume air samplers was completed. A flow rate of about 3.8 liters/minute was maintained for 25 hours.

Routine Activities

- (a) The regular weekly, monthly, and quarterly smear and radiation surveys of AEC facilities at the NRTS were completed. One contaminated instrument was smeared and the results were reported to the SPERT health physics office.
- (b) The disposal of radioactive laboratory waste and the laundering of anti-contamination clothing were arranged as required. Eleven boxes of waste, primarily samples of contaminated soil, were buried subsequent to the purge of CF-676.
- (c) Section personnel took the lead in purging CF-676 of items no longer considered essential.
- (d) Spot checks of the emergency kits were made and the instruments were found to be in satisfactory operating condition.
- (e) The Emergency Preparedness Appraisal was reviewed and comments were prepared.
- (f) Draft Environmental Statements for LOFT and PBF were prepared using input from INC, ESSA, USGS, and other AEC-ID divisions. Surveys of the animal habitats available in both areas were made as part of the evaluations of environmental impact.
- (g) Section personnel attended the meeting held in the Laboratory on 9 July to discuss the potential use of duplicate microcosms to evaluate environmental effects produced by pollutants.

Independent Measurements Program

The scope of the IMP increased again during this reporting period as the program of yearly in-plant sampling at the operating power reactors in the U. S. began.

The Humboldt Bay IMP Report No. 2 was drafted and is nearly ready for

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but should be started within a few weeks.

Nearly all of the IMP data that has accrued to date was coded and key punched for use with the IMP data storage and retrieval system.

The changes in the sampling frequencies (generally less frequent) and types of analyses (more specific isotopic analyses) on IMP samples from Nuclear Fuel Services-NY and Nuclear Fuel Services-Erwin, Tennessee were implemented as of July 1.

NRTS Environmental Monitoring

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

		<u>Alpha</u>	<u>Beta</u>	<u>Iodine</u>
May	On-Site	0.0015 pCi/m ³	0.833 pCi/m ³	0.0033 pCi/m ³
	Off-Site	0.0068 pCi/m ³	0.768 pCi/m ³	0.0046 pCi/m ³
June	On-Site	0.0018 pCi/m ³	1.011 pCi/m ³	0.0065 pCi/m ³
	Off-Site	0.0056 pCi/m ³	0.935 pCi/m ³	0.0059 pCi/m ³

All the above concentrations were less than 11% of the CG values for uncontrolled areas with the exception of the off-site alpha which is 33% of the CG value for unknown alpha emitters in uncontrolled areas.

The monthly average gross alpha concentrations for off-site locations are shown in pCi/m³ as follows:

	<u>May</u>	<u>June</u>		<u>May</u>	<u>June</u>
IF Hqts	0.0021	0.0022	Butte City	0.0017	0.0027
IF Airport	0.0022	0.003	Pocatello Fire	0.0064	0.0074
Blackfoot	0.0041	0.0032	Station		
Arco	0.0018	0.0021	Pocatello	0.033	0.0205
American Falls	0.0029	0.0037	Sewage Plant		

The average concentration of particulate material in on-site surface air for May and June was 23.38 µg/m³, compared to 71 µg/m³ for off-site locations.

Fourteen Bi-annual off-site water samples were collected and analyzed for alpha, beta, and tritium activity during May. All samples showed concentrations less than 3%, 5%, and 0.1% of their respective CG values.

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The average on-site ground water concentrations for gross alpha, beta and tritium activity for May and June were less than 7% of their respective CG values for drinking water. The tritium and strontium-90 activity in ICPP Well #2 continued to fluctuate during May and June. The high concentration for May was 5.3 pCi/l of ⁹⁰Sr and 2.57 x 10⁵ pCi/l of tritium compared to 10.0 pCi/l of ⁹⁰Sr and 7.3 x 10⁴ pCi/l of tritium during June.

Twenty-nine milk samples were collected and analyzed for iodine-131 and cesium-137 during May and June. All samples showed concentrations less than 20% and 0.3% of their respective CG values.

Other

Another draft of the report giving the results of our cooperative sampling program with the Idaho Department of Health was prepared.

An Emergency evacuation exercise at EBR-II was observed and comments were submitted to Bob Gray, Chief, Emergency Operations Branch.

A meeting was held in which the respective emergency roles of the Environmental Branch, the Fire Department, and the Physical Security Branch were discussed. The emergency SOP's of the Fire Department are being reviewed.

Robert Foster, WAE mathematician, has accomplished the following projects:

- (1) Redesign of the card input form for the IMP Data Storage and Retrieval System to allow insertion of data in the form of one analysis per card together with the number of days between sampling date and analysis date.
- (2) Modification of the computer update program of the above system to accept the new card format.
- (3) Modification of computer program in (1) to accept the new tape format resulting from the above changes.
- (4) Addition of programming subroutine to computer program in (1) to allow the option of performing decay corrections on the analytical results.
- (5) Investigation of suitable plotting subroutines for use with the system in (1).
- (6) Attendance at Mark IV programming class given at CSC.
- (7) Analysis of IMP Data Storage and Retrieval System to determine feasibility of changing to Mark IV system. After facing serious

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difficulty in correlating field sample results on one record with background results on another record and and difficulty in computing averages, discussions were held with Informatics systems engineers and it was concluded that Mark IV is not capable of handling the requirements necessary to the IMP Data Storage and Retrieval System.

- (8) Design and programming a system to store and retrieve the NRTS waste data on Mark IV.

U. S. Geological Survey

See attached report.

ESSA-ARLFRO - Environmental Science Services Administration

See attached report.

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Enclosures:

- 1. USGS Report
- 2. ESSA Report

cc: John R. Horan
C. A. Pelletier

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