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JAN 27 1970  
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Monthly Rpts. for 1966-70

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 Health Services Laboratory

ACTIVITY REPORT OF THE ENVIRONMENTAL BRANCH, DECEMBER 21, 1969 THROUGH  
 JANUARY 20, 1970

WASTE MANAGEMENT

Research

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The laboratory study on the permeability and exchange properties of the playa sediment in the vicinity of LOFT is near completion. Sr-85 analysis of the filtrate solution and that used for  $K_d$  (distribution coefficient) determination are needed for the interpretation of the experiment. Data on rate of infiltration indicate an initial rate of 1 ml/hr (0.28 gal/day/ft<sup>2</sup>) to about 7 ml/hr (2.0 gal/day/ft<sup>2</sup>) and then decreasing to approximately 2.5 ml/hr (0.7 gal/day/ft<sup>2</sup>) for 3 liters of solution. A change in rate seems to be a common occurrence in permeability studies.

Tritium analyses of soil water from a soil taken in Pit #2 of the Burial Ground are as follows:

H <sub>2</sub> O distilled at 100° C	10-20 pCi/ml
H <sub>2</sub> O distilled between 100° and 800° C	6800 pCi/ml

The data for water dilution at 100° C represent several analyses whereas the data for water distilled between 100° and 800° represent one analysis. More samples are being distilled, in an attempt to reproduce the above data. The effect of helium (purging gas) was found to be negligible. Also it was found that differential adsorption of tritium on the combustion tube for the two different temperatures could not account for the large difference in tritium concentration.

The study on the fractionation of tritium by precipitated aluminum hydroxide is continuing. Data on the adequacy of the procedure for sampling the "structural" water of the precipitate indicates that tritium in very small amounts of water (.05 ml) may be determined with sufficient accuracy. Data for solutions having higher salt concentrations are needed to further evaluate the procedure. Actual analysis of tritium from the "structural" water of aluminum hydroxide precipitates will be made in the near future.

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Environmental Monitoring

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

	<u>Alpha</u>	<u>Beta</u>	<u>Iodine-131</u>
On-Site	0.0024 pCi/m <sup>3</sup>	0.134 pCi/m <sup>3</sup>	0.005 pCi/m <sup>3</sup>
Off-Site	0.0085 pCi/m <sup>3</sup>	0.134 pCi/m <sup>3</sup>	0.005 pCi/m <sup>3</sup>

All the above concentrations were less than 12% of the CG values for uncontrolled areas with the exception of the off-site alpha which is 43% of the CG values for uncontrolled areas. The higher off-site alpha concentrations are due mainly to activity detected in the Pocatello area.

The monthly average gross alpha concentrations for off-site areas are shown in pCi/m<sup>3</sup> as follows:

IF Hdqts.	0.0036	Butte City	- 0.0018
IF Airport -	0.0034	Pocatello Fire Sta.	- 0.0114
Blackfoot	0.0042	Pocatello Sewage Plant	- 0.0378
Arco	0.002	American Falls	- 0.0041

The average concentration of particulate material in surface air on-site for December was 16.75 ug/m<sup>3</sup> compared to 56.75 ug/m<sup>3</sup> for off-site locations.

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

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

The analysis of water from CPP Well #1 indicated a very low level of Sr-90 contamination during the month, as follows:

	Concentration (pCi/l)		
	<u>Dec. 69</u>	<u>Previous 69 High</u>	<u>Previous 68 High</u>
Gross Beta	45(12/18) 32(12/24) 5(12/31)	113 (Oct.)	30 (Oct.)
Sr-90	18(12/24)	7.9 (Oct.)	9 (Oct.)
3H	3.7 x 10 <sup>4</sup>	8.5 x 10 <sup>4</sup> (March)	18 x 10 <sup>4</sup> (July)

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The concentration on December 24 may be a spurious occurrence and does not indicate reason for concern. Pumping of Well #1 was discontinued on or about January 1, 1970 and samples will not be available until February for verification.

The tritium sampling equipment has been installed on a Gelman Low Volume sampler for final testing. The tritium sampler designed for all purpose field use utilizes a plastic tube with silica gel for collecting airborne water and a flow rate meter for controlling air flow from 0.1 to 1.0 SCFH. Results indicate the silica gel is going to be around 90% efficient for collecting water. Further tests will establish an accurate collection efficiency and procedure for determining tritium concentrations by direct counting of the silica gel.

### Waste Disposal

Three individuals from NRF met with us again in January to discuss a proposed container design to be used for disposing evaporator waste. The proposed container will provide sufficient containment integrity to retain the waste radioactivity through several half lives. The improved container involves the combination of metal drums and cement. These types of containers, with some variations, will be used by both NRF (ECF) and ANL (EBR-II) for disposal of solidified liquid wastes at the NRTS burial ground.

### ENVIRONMENTAL STUDIES

#### Controlled Environmental Release Test (CERT) Program:

- (a) Five radiiodine release tests have been performed using the small CERTLE chamber in the plant growth room. A small fan has been installed in the generator section to produce a more even distribution of contamination.
- (b) The environmental control system in the plant growth room is still not functioning properly. INC people have worked on the system and continue to do so (but at a reduced pace.)
- (c) A reevaluation of the several methods of measuring stomatal opening was made. The immersion oil technique which we first used last May is still the method of choice for these measurements.
- (d) The small CERTLE chamber was decontaminated and prepared for a test of the transfer (if any) of  $^{85}\text{Kr}$  from air to vegetation. The test was executed on 20 January and results are not yet available.

- (e) The environmental chamber is being prepared for measurements of

OFFICE ▶	the flow using hot-wire anemometers. INC Instrumentation and Controls Branch has been requested to provide instrumentation for recording the data from these measurements.				
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- (f) Results of an experiment to measure retention of I-131 by HV-70 filters indicate only a 28% loss of activity following seven days operation during which uncontaminated air was pumped through the filters at the rate of 30 liters per minute.

Experimental Cloud Exposure Study (EXCES):

- (a) A thulium-170 source for use in the build-up factor study was produced in the ETR.
- (b) Additional testing of the EXCES aerosol generation mechanism was performed in the laboratory.
- (c) The EXCES source cask was decontaminated. A substantial amount of solid debris was found; we will establish a procedure for filtration of the source solution in the hot-cell prior to transfer to the cask to avoid possible line or nozzle blockage. A teflon funnel to facilitate the hot-cell transfer was constructed for us by the Instrumentation Branch.

Independent Measurements Program (IMP):

- (a) Report Number 6 for the Nuclear Fuel Services--New York (NFS-NY) program (April--June), 1969) was sent to the Division of Compliance, AEC Headquarters.
- (b) Comments on the draft of Report Number 1 for the Humboldt Bay reactor survey (May--July, 1969) have been incorporated and this report is ready for final concurrence and then reproduction.
- (c) Report Number 7 for NFS-NY (July--September, 1969) was written and graphs of the data are being prepared.
- (d) Report Number 3 for the Nuclear Fuel Services--Erwin program (July--October, 1969) is being written.
- (e) Bob Foster of Montana State University, with whom we have a contract for development of a computer program to handle the IMP data, spent several days at the Computer Science Center testing part of the program. The portion of the program which reads in, stores and updates the data has been almost completely checked out. The sub-program which assembles and prints the reports must now be written and debugged.
- (f) Analysis of the charcoal filters in the air stream of the sampler closest to the Mallinckrodt/Nuclear facility indicates that air concentrations of approximately  $1 \times 10^{-12}$  uCi/ml reach these filters. I-131 and Hg-203 have been identified by gamma spectrometry.

- (g) Recent water samples from NFS-NY sampling locations contain concentrations of  $^{90}\text{Sr}$  which are about ten times higher than the averages of previous  $^{90}\text{Sr}$  concentrations.

Other (Routine) :

Disposal of HSL radioactive waste and laundering of anti-contamination clothing were arranged as required.

Other (Non-routine):

- (a) Analysis of the wheat samples from areas around the NRTS was completed and the results were given to the Waste Management Section for inclusion in the Environmental Monitoring Report.
- (b) A memorandum recommending procedures and practices for a continuing good tower climbing safety record was prepared by Boyd Mortensen.
- (c) Additional radiation surveys of NRTS roads were completed. U. S. Highway 20-26 from the EBR-I junction to the EBR-II junction was surveyed; no contamination was detected. No contamination was detected on Washington Boulevard. Six spots of contamination were found on and removed from the west side of Lincoln Boulevard between TRA and TAN. Three of these were on that portion of Lincoln which is Idaho Highway 88.
- (d) Three Geiger-Muller survey meters from the emergency kits were used for about twelve hours by the road scanning crew; all performed satisfactorily. The emergency kits were spot-checked and the instruments were found in satisfactory condition. The kit cards (credit) were updated.
- (e) Ray McBride terminated 10 January 1970.
- (f) Section personnel responded to the test evacuation of TRA.
- (g) Voilleques' paper entitled "The Critical Organ for Plutonium Inhalation Exposure" has been accepted for presentation at the Second Congress of the International Radiation Protection Association in May.
- (h) A paper entitled "An Environmental Chamber for Mass Transfer Studies" by Charles A. Pelletier, Paul G. Voilleque' and Earl H. Markee (ARLFRO-ESSA) has been accepted for presentation at the 16th Annual Meeting of the Institute of Environmental Sciences in April.

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Health Physics

During the routine monitoring of the Laboratory during this period a total of 21 smears indicated activity above our limits of 10 d/m for alpha activity and 200 d/m for beta-gamma activity. Most of these (15) were taken in the source vault. The others were in laboratories, mostly in work areas such as hoods and laboratory benches. Most of these (13) had alpha activity of less than 50 d/m, but three showed 900-1000 d/m and one indicated approximately 2500 d/m. Three of the higher ones were in the source vault, including the highest one, and the other one was taken on a laboratory work bench.

All areas were cleaned except the source vault. Decontamination has been initiated there. The storage shelves which indicated the highest activity have been cleaned.

The following LOFT documents were reviewed during the reporting period:

1. SDD 1.3.25 - LOFT Radiological Grid System
2. SDD 1.4 - Data Collection System
3. SDD 1.3 - Support Facilities
4. SDD 1.3.14 - Heating, Ventilating and Air Conditioning for CSM Area and Exhaust to Stack System (HV System No. 8)

B. D. Johnson acted as an observer during the CPP practice evacuation January 16.

U. S. Geological Survey

See attached report.

ESSA-ARLPRO - Environmental Sciences Services Administration

See attached report.

Charles A. Pelletier, Chief  
Environmental Branch  
Health Services Laboratory

HSL

Enclosure:

1. USGS Report
2. ESSA Report

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

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