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HW-9443

HW 4.159

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Due to film deterioration, portions of this document may be illegible. PNL-5-91

Route List

1. ~~GG Lail~~
2. ~~HM Parker~~
3.
4.
5.

Classification Cancelled (Change to declassified

By Authority of RLO-GE-L

WA Snyder 4/4/91

DG Krusher 5/30/91

by ~~PNL Ack 5-30-9~~

[redacted]

DATE March 31, 1948

SUBJECT Rough Draft H.I. Department Report for Month of March 1948

TO File

FROM HM Parker

[redacted]

GG Lail [redacted]
HM Parker

H. M. Parker APR 5 1948

G G Lail 4/12/48

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REPOSITORY PNL

COLLECTION General

BOX No. N/A

FOLDER Reports

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By this time, the entire 200-E Area has been surveyed. This was done by emergency ordering of additional instruments, promptly supplied by the A.E.C. Instrument Branch, Oak Ridge, and by the assignment of all possible H. I. men to the task. Attempts to further expedite the work by loans of personnel from other departments were unsuccessful. The second section of the H. I. Training School was postponed indefinitely in order to concentrate on the above work.

J. W. Healy and F. E. Adley attended the American Industrial Hygienists Conference, Boston, Mass., where Healy contributed an invited paper. F. P. Seymour took part in Waste Disposal discussions at the Argonne National Laboratory. H. A. Kornberg represented the department at the Oak Ridge Biological Information Meeting, and R. F. Foster at the Fish Biologists meeting, Lake Quinalt.

There was no known instance of overexposure of personnel. Seven incidents were investigated under the Special Hazards Class 1 system. These included three improper entries into Radiation Danger Zones, two instances of hand contamination, one of laboratory floor contamination, and one error in Canyon sampling.

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Health Instrument Department

OPERATIONAL DIVISION

100 Areas

Work Permit Summary

	February	March	1948 To Date
100-B	102	121	347
100-D	839	954	2564
100-F	987	1092	2936
Total	1928	2167	5847

Retention Basin Effluent

The activity of the water leaving the Retention Basins was as follows:

	100-D	100-F
Power level	275	275
Average beta dosage-rate (mrep/hr)	0.8	0.9
Average gamma dosage-rate (mr/hr)	1.7	1.8
Average total dosage-rate (mrep/hr)	2.5	2.7
Average integrated dose in 24 hrs. (mrep)	60	65
Maximum integrated dose in 24 hrs. (mrep)	72	79
Maximum integrated dose in 24 hrs. (mrep) 1948	72	79

During excavation work along the effluent line from the 100-D Pile Building to the Retention Basin, active water was observed at several points along the line. No leak was found in the exposed portions of the pipe and further investigation was not attempted. Construction of a tile field outside the plant area about 200 yards north of the basin was started. Moist earth was uncovered by the excavation but no contamination was detected. Contaminated algae was encountered during work of heightening the north wall of the basin but was not a serious hazard.

Repairs were made to the west side of the 100-F Retention Basin and considerable contaminated algae and tumbleweeds were encountered. Increased activity was noted in the water leaving the operating side of the basin but the dosage-rate did not exceed 4 mrep/hr. The Danger Zone adjacent to the north side of the basin was enlarged when considerable contaminated algae was blown over the wall

100-B Area

The Power Department added chlorine to the Retention Basin in an effort to kill the algae growth there. No radiation hazard was encountered. Otherwise only routine and incidental maintenance work was attempted at the 100-B Area

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100-D Area

Surveys at the top, far edge of the pile revealed that the lid of the pile has now raised to a point where the step arrangement no longer affords proper shielding. A gamma and neutron beam, emerging at about a 45° angle, showed an estimated exposure rate at the face of the pile of 500 mrem/hr., including about 350 mr/hr. Correction factors for the size of the beam were difficult to obtain at this point due to the background from the neoprene seal. The beam is approximately an inch wide at the face of the pile and spreads to four inches at a distance of three feet. In length, the beam extends over about three-fourths of the far side of the pile. Passage through this beam via the far stairs has been discontinued.

Technical personnel took measurements on the graphite lattice by emptying the "A" experimental hole. Temporary shielding inserted in the hole kept exposure of personnel to a minimum. Samples were removed from the "B" experimental hole with no unusual readings reported. A fast neutron survey on the experimental level showed uncorrected readings of 30 mrem/hr in front of the "A" hole and 7 mrem/hr to the right of the "B" hole. A fast neutron reading of 2.5 mrem/hr was reported on the #6 T-section seam several feet above the experimental level. No neutron reading could be detected through the biological shield between the #5 and #6 T-section seams.

During replacement of one of the process tubes, one tube section lodged on the 10 foot level catwalk in the Discharge Area. It was removed easily with poles in a field of 10 mr/hr. Two other process tubes were removed and not replaced and special shields inserted in each end. The shield in the front end of the tube was later removed while the gas in the pile was at a positive pressure. Radioactive graphite was blown out of the tube onto the elevator and tube caps below. The Van Stone flange work on the front and rear faces was completed with a moderate spread of contamination, other work to the process tubes was carried out without incident.

An exposure rate of 20 mr/hr at 20 feet was observed when the tip of rod #31 was removed from the thimble. The corrected beam reading from the open thimble was 2 roentgens per hour. Personnel, however, were exposed to only very low dosage rates. The vertical safety rod thimbles were pressure tested, and aligned by shimming the test plugs. Exposure rates were nominal.

The radiation level on top of the pile increased noticably when the doors to the 115 Building were left open. This increase was caused by the resultant breakdown of the exhaust air system at the top of the pile.

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Much of the contamination in the Drier room in the 115 Building was satisfactorily removed. Some contamination was observed in the transfer area in the vicinity of the center floor drain. Air contamination in the sample rooms persisted even after the installation of new seals in the drains. A part of this contamination may be coming from the Xmas trees in these rooms.

100-F Area

During the removal of samples from the "D" experimental hole, a large amount of loose contamination was dispersed over the experimental level and parts of the zero foot level below. This contamination was not immediately apparent and was carried on shoes to areas outside the Danger Zone. Ten persons received either high hand or shoe counts or both, and one pair of shoes could not be immediately decontaminated and was confiscated. All hand contamination and the remaining shoes were decontaminated to below the warning level.

High dosage-rates were observed during the burial of dummy slugs and tube sections. In one case a bucket of lead dummies read 2 roentgens per hour at 8 feet and 1 roentgen per hour through 12-15 inches of water as it was returned to the basin. Readings at the edge of the burial trench rose to 1.2 roentgens per hour and the Danger Zone boundaries were extended temporarily. Exposures to personnel did not exceed 100 mrep per day.

A beam of gamma radiation was discovered emerging from the step joint in the biological shield at the top far edge of the pile. The location and direction of the beam is similar to the one at the 100-D Area, but the beam is less intense and is not accompanied by neutrons.

Several tests in connection with the problems of the proposed segmented discharge were made. Surveys indicated that perforated aluminum slugs, used in the discharge operation, can be removed from the front end of process tubes, during the back-seating of the near dummy charge, without causing any appreciable contamination problem. Also, surveys showed that the end caps of tubes loaded with the cap-shield pieces do not become activated by neutrons during pile operation.

The Technical Department radiography assembly was moved from the #2 purification room into the transfer area and lowered into the basin for an exchange of radioactive slugs. After relocation in the purification room a reading of 70 roentgens per hour at one foot was obtained in front of the open cask. A momentary exposure-rate of about 250 mr/hr occurs when the cask is opened or closed.

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A beam of 225 roentgens per hour was observed over the loading slot at the "E" experimental hole assembly, during the loading of samples. Samples removed from the hole read up to 4 roentgens per hour at 2 feet. Personnel was exposed for short periods to rates up to 500 mr/hr. Neutron surveys on the experimental level showed readings of 25 mrem/hr, with about half due to fast and half due to slow neutrons.

Some difficulty was experienced in the removal of the special charge from tube #1481. The charge was freed from the rear face and subsequently removed by means of a push pole from the front face. Exposure to personnel was slight. Four process tubes were replaced without incident and Van Stone flange work was completed on both faces with only contamination as any particular problem.

High gas activity in the work area and hallway of the Pile Building resulted when the damper on the #3 fan was opened too wide.

200 Areas, T and B Plants

General Statistics

	February			March			1948
	T	B	Total	T	B	Total	To Date
Special Work Permits	290	307	597	376	382	758	2116
Routine & special surveys	288	284	572	294	323	617	1867
Air Monitoring Samples	340	523	863	284	632	916	2630
Thyroid Checks	190	159	349	251	153	404	1131

Canyon Buildings

The canyon air in the T Plant was highly contaminated on two occasions when cell blocks were removed in order to observe jetting operations in an effort to find a process leak. Filters from air samples taken showed surface dosage-rates of 200 and 125 mrep/hr and product results of 1×10^{-10} µg Pu/cc and 2.5×10^{-9} µg Pu/cc, respectively. The 8-2 centrifuge was replaced in connection with this work without incident. The constant air monitor at R-19 was immediately driven off scale during the first instance of canyon air contamination, and much of the equipment must be replaced in order to put the instrument back in service.

Puffs of air were noted coming from connector #31 at Section 13 in the B Plant Pipe Gallery when it was opened for insertion of a blank and was undoubtedly the cause of personnel and protective clothing contamination received by workers in the vicinity. The contamination was easily cleaned. Considerable protective clothing contamination occurred during welding in cell 17L but was not spread. Attempts to weld the 14-1 tank stored in cell 19L were abandoned due to high radiation levels.

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High radiation fields were encountered during sampler repair work in both canyons but work was well executed and controlled and no undue exposures resulted.

Control Laboratories

The T Plant laboratory was re-opened in order to train personnel for the Chemical Development program. No product or fission product work is planned in the building and only casual H. I. coverage.

In the B Plant, a total of 317 non-regulated items was found contaminated on surveys by Technical and H. I. personnel In addition 109 floor spots were detected. One instance of general floor contamination was found when routine shoe checks disclosed several pairs contaminated. Surveys of the entire building noted 20 spots in the hallway and 45 in the men's locker room where a maximum surface dosage-rate of 1.8 rep per hour was reported. The general pattern of spots was from the sample equipment windows, through the main hall, and into the locker room. The contamination most likely originated in the handling of sampling equipment in the entrance hallway, which went undetected at the time.

There were 27 instances of skin contamination reported, all of which were successfully reduced.

Concentration Buildings

In the T Plant about 90 µg Pu was reported on surfaces in the deep section of C cell around the C-4 tank. Difficulty was experienced in jetting from Section 17 and vapor was observed emitting from around the C-4 agitator shaft which may account for the contamination. A scalp laceration was sustained when an employee struck his head against an air duct in E cell. No contamination was found.

Three instances of hand contamination were reported in the B Plant, both at low levels and easily cleaned. A process leak in the D cell balcony caused general high level product contamination. Before the leak was detected contamination was tracked into the D cell balcony on rubbers which then were removed and carried down to G cell. The rubbers were put on again and entry made to G cell where further floor contamination resulted. The leak was repaired and decontamination completed.

Stack Areas

The #1 fan and duct work in the T Plant was removed and replaced with stainless steel equipment without incident. The inspection plate on the #2 fan was removed and regasketed. A brown, rust-like deposit

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was noted on the inside surface of the plate and analysis showed rather close similarity to active particles found in the areas, with a higher percentage of short lived fission products and correspondingly lower percentage of longer lived fission products.

Waste Disposal Areas

Ground contamination was reported near the vent pipe of the #1 crib in the 361-T Tank area, with dosage-rates up to 4.5 rep per hour noted. About 15 sq. ft. of ground was involved and it was thought that the contamination occurred in conjunction with the leak in Section 8 whereby increased activity could be expected in cell wash water.

The liquid in the sampling shaft adjacent to the 2nd cycle waste crib in the 241-B Area was pumped back into the crib. No detectable readings were found on equipment used or protective clothing.

General

A total of 5182 Martindale mask pads was checked with a G.M. probe in the T Plant of which 3036 were surveyed by film exposures. Active particles were suspected in 140 of the film checks and confirmed in 44 cases.

At the month end the use of Martindale pads was extended to include the "B" Plant exclusion area.

The Isolation Building

Air Monitoring

There were 253 spot air samples taken of which 4 were above 10^{-11} µg Pu/cc with the maximum result of 3.9×10^{-11} µg Pu/cc obtained in cell 1 during a S.W.P. job. Sixty Little Sucker samples, run continuously by shifts, had as the high result 5×10^{-12} µg Pu/cc and 15 samples of the 903 exhaust system had a high result of 2×10^{-12} µg Pu/cc. In addition 85 special air samples in connection with filter media tests and canister tests were taken.

Surface Contamination

A total of 242 non-regulated items was found contaminated on surveys by Technical, H. I., and "S" Department personnel. Ten items above 20,000 d/m and two above 80,000 d/m were reported. There were 11 instances of floor contamination, and 2 instances of skin contamination reported.

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Gamma Radiation

P.R. Container	6.5 mr/hr (maximum)
Process Hood	2.5 mr/hr (maximum)
S.C.	4.5 mr/hr (maximum)

The 300 Area

General Statistics

	February	March	1948 To Date
Special Work Permits	281	367	803
Routine and Special Surveys	162	165	512
Air Monitoring Samples	112	151	399

Metal Fabrication Plant

Twenty-nine air samples taken by "P" Department and 61 by H. I. personnel are summarized as follows:

Location	No. Taken	No. Above 1.5×10^{-4} µg U/cc	Maximum Concentration µg U/cc
Extruder Building	2	2	6.2×10^{-4}
Chip Recovery	9	1	1.8×10^{-4}
Oxide Burner	9	5	6.1×10^{-3}
Machining	3	1	7.3×10^{-4}
Boxcar unloading	6	6	1.2×10^{-2}
Melt Plant			
Furnace Room	27	24	6×10^{-3}
Burnout Room	13	13	6.4×10^{-3}
Machining & Sawing	13	11	2.9×10^{-3}
Adjacent Extruder Building	8	5	3.9×10^{-4}

Some samples were taken in areas where high concentrations were expected, others represent working conditions. Two respirator filters worn for 8 and 10 hours showed surface dosage-rates of 3 and 45 mrep/hr, respectively. About 120 mg uranium oxide was calculated as the deposit on the more active of the filters.

Retention Pond

The maximum results obtained on samples taken by Site Survey were:

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Location	alpha d/m/liter	beta μc/liter
Water, Inlet	1405 ± 40	6.5×10^{-3}
Water, N.W. Corner	220 ± 12	1.5×10^{-4}
	alpha d/m/g	**beta μc/kg**
Mud, Inlet	30,464 ± 502	4.1
Mud, N.W. Corner	840 ± 22	0.18

Since startup of Chemical Development work in the Semi-Works, 238.3 lbs. of uranium has been discharged to the Retention Pond.

Technical Building

No high air sample results were obtained. About 0.3 g U was found on the floor on the Instrument Shop adjacent to the counting room when a piece of contaminated equipment was brought in from the 303 Area. The spill was not spread and was easily cleaned.

Laundry Decontamination and Hand Counting

A total of 139,411 items was monitored in the Plant Laundry, including 49,622 alpha checks. There were 30,672 coveralls, 39,632 gloves, 39,359 overshoes, and 3,422 slacks and jackets included.

Sixty-two spot and 43 Big Bucker air samples had as the high result 4.4×10^{-11} μg Pu/cc obtained while 300 and 200-West area clothes were being washed.

There were 38,570 alpha hand checks, and 57,459 beta hand checks recorded. About 0.29% of the alpha, and about 0.29% of the beta scores were above the warning levels. Most of this increase in high scores was in the 300 Area where uranium was the contaminant. A large number, 49 alpha and 98 beta scores, showed no attempt at reduction; all were in the 300 Area. Investigation disclosed that most of these had been reduced but not recorded. Where decontamination was attempted it failed in one instance of alpha and two instances of beta contamination according to the score cards. Investigation, however, showed all had been reduced.

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PERSONNEL METERS

Pencils	100-B 100-D	100-F	K&N 200	200-W	300	Total	1948 To Date
Total Pencils read:	10,962	13,869	31,412	40,912	36,100	133,255	370,904
No. single readings: (100 to 280 mr)	56	52	69	120	319	616	1,439
No. paired readings: (100 to 280 mr)	2	0	0	2	1	5	10
No. single readings: (Over 280 mr)	90	117	129	76	150	562	2,019
No. paired readings: (Over 280 mr)	2	3	2	1	3	10	30
Paired readings lost:	1	0	0	2	0	3	16

No significant result was confirmed by the badge result. Investigation of lost readings disclosed no possibility of an overexposure.

Badge Resume, Construction Areas

	105-DR	241-TX	384	Total	1948 To Date
Badges Processed:	14,642	5,019	353	20,014	38,697
No. of readings: (100 to 500 mrep)	3	2	0	5	8
No. of readings: (Over 500 mrep)	0	0	0	0	0
Lost Readings:	8	2	0	10	33

Four lost readings were attributed to lost in processing, one lost in area, one stuck film and four were partially lost when the sensitive film was not packaged.

Badges	100-B	100-D	100-F	200-E	R.R.T. 200-N	200-W	300	Total
Badges Processed:	2,881	4,939	5,016	4,393	590	6,734	6,304	30,857
No. of readings: (100 to 500 mrep)	1	0	3	0	1	12	142	160
No. of readings: (Over 500 mrep)	0	0	0	0	0	0	6	6
Lost Readings:	0	2	4	1	0	3	1	11

Total 1948 Badges to date were 85,527.

Lost readings were accounted for as follows:

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Badge lost in area	5
Badge dropped in water	1
Stuck film (open window only lost)	1
Sensitive film not packaged	1
No packet in badge	2
Sensitive film lost in processing (Insensitive read 0-0)	1

No readings over 500 mrep were attributed to radiation, they were accounted for as follows:

Defective film	4
Contaminated, recovered lost badge	1
Exposed to heat	1

In addition 2,629 items of non-routine nature were processed, 1948 total to date 4,954.

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CONTROL AND DEVELOPMENT DIVISION

Water Monitoring

Three hundred and fifty samples of drinking water were taken during the month. The maximum alpha contamination of about 9 dis/min/liter was found in the 300 Area #1 well. Positive alpha contamination was also detected in the #2 well in the 300 Area which had about 5 dis/min/liter and in the 300 Area sanitary water which had about 5 dis/min/liter. No sample had beta activity as high as 5×10^{-5} μc/liter.

Seven test well samples were taken with no detectable alpha or beta activity.

Sixty four samples were taken from the Columbia River. Slight positive indications of alpha activity amounting to about 2 dis/min/liter were found at 100-B, 100-D and Hanford, resamples did not confirm these results. Maximum beta activity was 5.5×10^{-4} μc/liter in a sample from Hanford. Twelve samples were taken from the Yakima River and there was no detectable alpha or beta contamination.

Atmospheric Monitoring

The average dosage rates measured by means of integrons and "C" Chambers were:

Location	Integrons (mrep/24 hours) February	Integrons (mrep/24 hours) March	C Chambers (mrep/24 hours) February	C Chambers (mrep/24 hours) March
100-B	0.3	0.2	0.3	0.3
100-D	0.3	0.3	0.4	0.4
100-F	0.9	1.4	0.4	0.4
200-W	0.3	0.1	0.3	0.3
200-E	1.0	1.3	0.4	0.3
Riverland	1.2	1.3	---	---
Hanford	1.0	1.3	---	---
300 Area	1.3	1.3	0.3	0.3
700 Area	0.8	<0.1	---	---
Kennewick	<0.1	0.4	---	---
Pasco	0.1	<0.1	---	---
Benton City	0.1	<0.1	---	---

The maximum eight hour reading on a constant iodine monitor was 4.4×10^{-7} μc/liter at Gable Mountain. The highest average concentration for the month was measured at the 200-W Tower #4 which had 1.7×10^{-9} μc/liter. Sixty one rain samples were collected; the maximum activity being 1.7×10^{-2} μc/liter in a sample from the 200-W Area. The maximum off area sample was again collected at Riverland which had 7.0×10^{-4} μc/liter. [redacted]

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Land and Vegetation Contamination

Three hundred and twenty-one vegetation samples were collected

Location	Average for February	μc I^{131} per kg. March Maximum	Average
North of 200 Areas	0.07	0.20	0.04
Near the 200 Areas	0.24	3.75*	0.22
South of 200 Areas	0.08	0.22	0.05
Richland	0.06	0.08	0.04
Pasco	0.04	0.10	< 0.04
Kennewick	0.04	0.09	0.09
Benton City	0.07	0.05	0.05
Richland Y	0.04	0.11	0.11
Hanford	0.05	0.06	0.06

*Collected at Route 3 mile post 2.

Twenty-five samples were collected at Goose Egg Hill; maximum sample activity noted was 2.18 μc/kg; the average was 0.22 μc/kg.

Fifteen vegetation samples were taken between 300 Area and Hanford; overall average was 0.04 μc/kg and the maximum was 0.09 μc/kg.

Well Drilling

Three wells located about 1000 feet from the 361-B dry well were drilled to completion to the water table during the month making a total of 6 wells around the dry well. Water samples from each have had positive alpha contamination and four of them have positive beta contamination. Maximum alpha contamination was about 160 dis/min/liter in the 361-B-1 well located 500 feet west of the dry well. This well also had beta activity of about 0.1 μc/liter. A value of 40 dis/min/liter was found in the 361-B-5 well located 1000 feet N.E. Two more wells #7 and #8 are being drilled at distances of about 2500 feet to the east and to the south in an attempt to establish boundaries for this contamination. Another well #9 is being drilled only 50 feet from the dry well.

All of the 7 wells in the 241-BX Area were perforated and are now complete.

Near the end of February, while jetting into the second cycle crib at 241-B, the laterals from the H. I. shaft overflowed flooding the shaft. Jetting was stopped and the laterals were capped and shaft was pumped out. Beta contamination of this solution in the shaft amounted to about 0.5 μc/liter. Jetting was again started but after about 8 hours the shaft was again observed to be leaking

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through the joints and around the bottom lateral. After again cleaning the shaft and coating all joints with water proofing compound jetting was started again on March 31 and no leakage was observed.

No significant contamination was observed in a soil sample obtained from well #241-T-1 at a depth of about 20 feet beneath the #3 crib.

Bio-Assay

Four hundred and fifty-six urine samples were analyzed for plutonium. Two resamples were necessary this month because of low spike yield. All high samples have been resampled and re-run with the exception of the two for March and three in February; the latter samples are in process and the former samples were all less than 0.6 d/m.

A statistical analysis, based in counting about eighty 1½ inch diameter stainless steel sample discs on the Low Background alpha counters indicated the overall average to be essentially zero counts per minute and would not contribute to the activity measured in the samples by our process.

Four-hundred thirty-one urine samples have been analyzed for beta activity. A spike consisting of Ruthenium, Yttrium, Cerium, and Cesium has been prepared and calibrated and is to be used by the Bio-Assay Group for checking the overall recovery yields on the beta process.

Sixty urine samples, one hundred and nine water samples, and sixty-one special hexone samples were analyzed by the fluorophotometer method.

The three high urine readings previously obtained which were >1 μg/liter were re-run and the following results were obtained:

#1. 7.5 and 8.3 μg/liter
#2. 6.4 μg/liter
#3. 1.8 μg/liter

One high reading measured in March was 20.5 μg/liter; a resample and re-run showed 15.2 μg/liter.

Biological Monitoring

One of the rabbits being kept in cages near the T Plant stack escaped from its cage and was at liberty in the plant area for a period of five days during which time it fed on vegetation growing near the fans. The rabbit was sacrificed on December 19, 1947 and various tissues were analyzed for radioactivity. A sample of bone had about 0.05 μc/kg which has been decaying with a half life of about 100 days. This half life and absorption curves suggest a mixture

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of cerium, yttrium and strontium. A sample of marrow only had practically no activity so most of the activity was in the hard bone. The location in the bone suggests the presence of 55 day strontium but no half life as short as that can be found in the decay curve.

A rabbit which had had radon seed implants in the testis and under skin of the back has been sacrificed, tissue preparation is not complete but no macroscopic changes were observable.

A female duck from the flock kept on the river at 100-F was sacrificed. All tissues had from 30 to 60% less activity than the one sacrificed last month. Two ducks now being fed algae from the 100-F Retention Basin will be sacrificed next month.

Four experimental rats of the second generation have been sacrificed. Although these rats had lived on Retention Basin water since birth the activities in the tissues were quite low. Liver and kidney were highest with about 2.5×10^{-3} μc/kg.

A nanny goat was given several active specks early in January. Nine weeks later she was sacrificed and her tissues and those of her fetus were checked for activity. The mothers thyroid had only 1.3 μc/kg and a bone sample had 2.3×10^{-2} μc/kg; all other tissues had less than 1.0×10^{-2} μc/kg.

Fish Laboratory

Studies on the effect of area effluent water in strengths ranging from one part effluent in five parts of river water to one part effluent to two-hundred fifty parts river water have been continued but with a brief interruption during the latter part of the month due to equipment failure. Results are essentially the same as reported last month with the concentrations of 1:5 and 1:10 adversely affecting the fish. Pre-pile process water continues to cause mortalities in the fish similar to those caused by Retention Basin water, residual chlorine being a contributing factor. Continual exposure to 2.0 p.p.m. dichromate seriously affects the young salmon.

Eggs have thus far been obtained from 59 of the adult trout. Nearly all of them have been from fish exposed to Retention Basin water. These eggs are now incubating in the laboratory.

Tests with copper sulfate have shown that prolonged exposure of young chinook salmon to a concentration of 0.5 p.p.m. is lethal and that a concentration of 0.2 p.p.m. inhibits growth. Retention Basin algae is now being subjected to 0.2 p.p.m. copper sulfate in the laboratory to determine the effect.

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Routine quantitative sampling of algae, higher aquatic plants, invertebrate animals and fish of the Columbia River has been continued in conjunction with activity studies. Some forms of the bottom living invertebrate animals have shown a decided increase in abundance during the past two weeks. At the end of the month increasing numbers of young chinook salmon were being taken in the trap in the 182 Reservoir; indicating a successful spawning season for the salmon but also incomplete screening efficiency at the river pump house.

Methods Development

The use of a calorimeter bomb method for ashing of tissue and vegetation samples shows promise of being more sensitive than the present methods. The tests were run in conjunction with the study of long lived activities on vegetation samples.

The measurements of $C^{14}O_2$ in the 100-D pile gas are being continued. The results so far are still somewhat ambiguous. The interference from S35 has been eliminated but further analysis has not been too successful. Some of the chemical properties of the soft beta emitters are similar to those of lead.

Some work has been done to improve the recovery of fission products from urine samples using spikes of materials received from Clinton Laboratories. So far fair yields have been obtained for Zr-Cb, Sr, Ce and Y but not on Ru and Cs.

Point sources of Ra D, E, F have been prepared to serve as calibration standards for the beta sets in the counting rooms.

Some work has been done measuring filters contaminated with fission products to calibrate a C.P. meter so that it may be used to measure the amount of activity present in terms of μc. With a 4 inch disc of contaminated filter paper held ¼ of an inch from the C.P. window a reading of 66 mrep/hr is observed per μc of Cerium and 32 mrep/hr is observed per μc of Cs

Instrument Development

Six portable poppies were constructed and have been field tested for about two weeks. During that time there have been three battery failures, one switch failure and one probe failure. Performance seems to be satisfactory and the sensitivity is sufficient to detect 150 dis/min of alpha activity in the field.

The beta water monitor operated for a period of 15 days and although the GM tube did not become contaminated there was some increase in background due to contamination of the water chamber indicating a need for additional shielding.

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Health Instrument Department

The rebuilt "neut" survey meter has been in the field and performance seems to be satisfactory. Reduction in transients due to switching was accomplished by placing the switch in the grounded ends of the high resistors.

Proportional counter studies concerned with optimum probe wire voltage and input resistor values have revealed information apparently sufficient to allow operation of a probe with thin windows on both sides. This arrangement is to allow placement of GM tubes behind the probes so that both alphas and betas can be measured at the same time. This device is intended to be used first in hand counters.

Physics

The data obtained in the experiment with the neutron beam from the B hole in the 100-F Pile are being analyzed.

The collection and analysis of counter statistics is essentially complete and a separate report is to be written.

The extrapolation chamber is being studied and there are a few defects yet to correct before it will be ready for making measurements. The main trouble seems to be in the construction of a suitable cellophane diaphragm which serves as one of the electrodes.

Calibrations

The routine calibrations were:

RADIUM CALIBRATIONS	Number of Calibrations February	March
Fixed Instruments:		
Gamma	528	492
Portable Instruments:		
Alpha	55	49
Beta	87	92
Gamma	340	424
X-ray	3	2
Neutron	4	4
Total	489	571
Personnel Meters:		
Beta	1,162	1,470
Gamma	8,659	8,780
X-ray	2,774	3,468
Neutron	18	56
Total	12,613	13,774
GRAND TOTAL	13,630	14,837

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