[redacted]

HW-39429

Health and Safety
(M-3679, 17th Ed.)

This document consists of 64 pages. [redacted]

RADIOACTIVE CONTAMINATION IN THE HANFORD ENVIRONS FOR THE PERIOD JULY, AUGUST, SEPTEMBER 1955

By

B. V. Andersen
And
J. K. Soldat

Regional Monitoring Unit

October 10, 1955

HANFORD ATOMIC PRODUCTS OPERATION
RICHLAND, WASHINGTON

Operated for the Atomic Energy Commission by the
General Electric Company under Contract No. W-31-109-Eng-52

[redacted]

Route To:	P. R. No.	Location	Files Route Date	Signature and Date
[redacted]				

[redacted]

INTERNAL DISTRIBUTION

Copy Number	
1	H. M. Parker
2	W. K. MacCready
3	A. B. Greninger
4	R. S. Bell - W. M. Mathis - J. H. Warren
5	C. A. Priode
6	W. D. Norwood - P. A. Fuqua
7	D. P. Ebright - A. J. Stevens
8	H. A. Kornberg
9	D. W. Pearce - J. F. Honstead
10	P. R. McMurray - J. W. Healy
11	R. E. Rostenbach
12	A. R. Keene
13	P. C. Jerman
14	K. R. Heid
15	B. V. Anderson
16	G. R. Hilst - D. L. Reid
17	H. T. Norton
18	300 File
19	Yellow File
20	Extra Copy

EXTERNAL DISTRIBUTION

Copy Number	
21	Aeromedical Laboratory (WADC)
22	AF Plant Representative, Burbank
23	AF Plant Representative, Marietta
24 - 25	AF Plant Representative, Seattle
26	AF Plant Representative, Wood-Ridge
27	Aircraft Laboratory Design Branch
28	ANP Project Office, Fort Worth
29	Alco Products, Inc.
30	Argonne National Laboratory
31	Armed Forces Special Weapons Project (Sandia)
32	Armed Forces Special Weapons Project, Washington
33 - 34	Army Chemical Center
35	Army Medical Research Laboratory
36	Army Medical Service Graduate School
37 - 39	Atomic Energy Commission, Washington
40	Battelle Memorial Institute

[redacted]

EXTERNAL DISTRIBUTION (Contd.)

Copy Number	
41 - 42	Bettis Plant (WAPD)
43 - 44	Brookhaven National Laboratory
45	Brush Beryllium Company
46	Bureau of Medicine and Surgery
47	Bureau of Ships
48	Bureau of Yards and Docks
49	Chicago Patent Group
50	Chief of Naval Research
51	Columbia University (Failla)
52	Combustion Engineering, Inc. (CERD)
53	Convair-General Dynamics Corporation
54	Department of Navy-OP-362
55	Dow Chemical Company (Rocky Flats)
56 - 58	duPont Company, Aiken
59	Duquesne Light Company
60	Engineer Research and Development Laboratories
61	Foster Wheeler Corporation
62	General Electric Company (ANPD)
63	Goodyear Atomic Corporation
64	Hanford Operations Office
65 - 66	Headquarters, Air Force Special Weapons Center
67	Iowa State College
68 - 70	Knolls Atomic Power Laboratory
71 - 72	Los Alamos Scientific Laboratory
73	Mallinckrodt Chemical Works
74	Massachusetts Institute of Technology (Evans)
75	Mound Laboratory
76	National Advisory Committee for Aeronautics, Cleveland
77	National Lead Company of Ohio
78	Naval Medical Research Institute
79	Naval Research Laboratory
80	New Brunswick Area Office
81	New York Operations Office
82 - 83	North American Aviation, Inc.
84	Nuclear Development Associates, Inc.
85	Nuclear Metals, Inc.
86	Office of the Quartermaster General
87	Patent Branch, Washington
88 - 93	Phillips Petroleum Company (NRTS)
94	Pratt and Whitney Aircraft Division (Fox Project)
95	Public Health Service

EXTERNAL DISTRIBUTION (contd.)

Copy Number	
96	RAND Corporation
97	Sandia Corporation
98	Sylvania Electric Products, Inc.
99	The Surgeon General
100	Union Carbide Nuclear Company (C-31 Plant)
101	Union Carbide Nuclear Company (K-25 Plant)
102 -105	Union Carbide Nuclear Company (ORNL)
106	USAF Radiation Laboratory
107	U.S. Naval Postgraduate School
108	U.S. Naval Radiological Defense Laboratory
109	UCLA Medical Research Laboratory
110 - 111	University of California Radiation Laboratory, Berkeley
112 - 113	University of California Radiation Laboratory, Livermore
114	University of Rochester
115	University of Tennessee (UTA)
116	University of Washington
117	Vitro Engineering Division
118 - 121	Western Reserve University (Friedell)
122	Wright Air Development Center (WCOSI-3)
123 - 237	Technical Information Service, Oak Ridge

ABSTRACT

SECTION I: RADIOACTIVE CONTAMINATION IN EFFLUENT GASES

Total average I^{131} emission from S and T-Plant stacks this quarter was 1.7 curies per day with approximately half of this total coming from each facility. Maximum daily I^{131} emission from T-Plant was 8.2 curies per day on August 26 and 27, 1955, while the maximum at S-Plant was 6.8 curies per day on September 22 and 23, 1955. Average ruthenium emission from S-Plant was below the detection limit of approximately 0.01 curie per day throughout the quarter. Total average tritium oxide emission from all reactor area stacks was 0.62 curie per day. Three positive C^{14} measurements and 16 positive S^{35} measurements were obtained at the reactor area stacks this quarter. Maximum C^{14} and S^{35} results were 9.9×10^{-3} and 6.9×10^{-3} curie per day, respectively.

Few significant changes were noted in the activity density of alpha and beta particle emitters and in the concentrations of radioactive particulate matter in the reactor area effluent gases.

SECTION II: RADIOACTIVE CONTAMINATION ON VEGETATION

Average concentrations of radio-iodine in the environs decreased markedly from the previous quarter. The major decrease was in radio-iodine originating from nuclear detonations.

The measurements for non-volatile beta particle emitters revealed values consistent with normal values from last quarter. The off-site contamination, from nuclear detonations last quarter, was reduced by rainfall and decay to normal values.

Analysis for alpha particle emitters on vegetation indicated either low or negative results for the quarter.

SECTION III: RADIOACTIVE CONTAMINATION IN THE ATMOSPHERE

Dose rates measured by Victoreen Integrons remained at average values ranging from <0.3 to 6.7 mrad/day in and near the production areas. No significant changes were measured by detachable ionization chambers in the average dose rates present in all locations. General decreases were measured in the activity density of beta particle emitters filtered from air; concentrations averaged between 1.7×10^{-13} μc/ml and 7.7×10^{-13} μc/ml at all locations. General decreases in radioactive particle concentrations in air were noted at most locations; the average concentrations did not exceed 0.27 ptle/m^3 at any location. The concentration of airborne I^{131} remained normal for the quarter.

SECTION IV: RADIOACTIVE CONTAMINATION IN HANFORD WASTE

The average activity of beta particle emitters discharged to the Columbia River from reactor retention basins decreased significantly in all reactor areas, except 100-F and the new 100-K Areas. The decreases can be ascribed to the expected improvement in coolant water quality following the completion of the spring "run-off" season. Trace quantities of alpha particle emitters, plutonium, and polonium were found in isolated samples from the effluent basins in various areas. I^{131} discharged to the river from the Animal Farm averaged 30 μc/day. Ground surveys around Redox continued. Particle frequency maps covering the plant and adjoining areas may be referred to in the text.

SECTION V: RADIOACTIVE CONTAMINATION IN THE COLUMBIA RIVER AND RELATED WATERS

An increase in the average flow rate of the Columbia River from 1.0×10^6 gps last quarter to 1.7×10^6 gps this quarter, resulted in general decreases in the activity density of beta particle emitters in river water, mud, and in raw water derived from the Columbia River. Beta particle emitter activity density in the Columbia River ranged from less than 5×10^{-8} μc/ml above the Hanford project to 3.0×10^{-5} μc/ml below 100-H Area and near Hanford. Maximum measurements below McNary Dam were 4.9×10^{-7} μc/ml just below the dam, and 2.2×10^{-7} μc/ml at the Maryhill Ferry landing. All measurements for alpha particle emitters in river samples collected this quarter were below the detection limits of 5×10^{-9} μc/ml for water and 3.6×10^{-6} μc/gm for mud.

SECTION VI: RADIOACTIVE CONTAMINATION IN RAIN

The activity density of beta particle emitters in rain decreased significantly at all sampling locations. Concentrations were highest in the vicinity of the Redox Plant where an average concentration of 6.3×10^{-6} μc/ml included a maximum of 2.2×10^{-5} μc/ml. Concentrations at all other locations were in the range of <1 to 6×10^{-6} μc/ml.

SECTION VII: RADIOACTIVE CONTAMINATION IN DRINKING WATER AND TEST WELLS

Average concentrations of alpha particle emitters at or above the detection limit of 5×10^{-9} μc/ml were obtained from only three drinking water supplies this quarter. All of these water sources were supplied from wells and the alpha activity was confirmed by uranium analyses. The maximum alpha particle emitter activity density of 2.1×10^{-8} μc/ml was measured at the Benton City Water Company well where natural uranium activity has consistently been found in the past.

[redacted]

Water sources derived from the Columbia River showed general decreases in beta particle emitter activity density this quarter, reflecting increased dilution of reactor effluent water caused by higher river flow rates. Activity density of beta particle emitters in all drinking water sampled ranged from <0.05 to 3.2×10^{-7} μc/ml; average values for Pasco and Kennewick water supplies were 3.2 and 1.9×10^{-7} μc/ml, respectively. The increasing trend in activity density of alpha particle emitters noted during the previous two quarters at test wells 303-4, 303-7, and 303-11 was reversed this quarter when average values ranged from one-fifth to one-half of those noted last quarter. As in the past, uranium activity was detected in 300 Area Wells No. 1, No. 2, and No. 4.

[redacted]

INTRODUCTION

This document summarizes the results obtained from monitoring the Hanford environs for radioactive contamination during the period July, August, and September, 1955. Samples were collected by Regional Monitoring forces according to procedures previously outlined in documents of this series (1, 2, 3). These samples were analyzed by Radio-Analysis Laboratory forces according to procedures and techniques described in a previously published laboratory manual (4). Counting rates obtained from these analyses were corrected for geometry, backscatter, air-window absorption, source size, self-absorption, chemical yield, and collection efficiency by Radio-Analysis Laboratory forces using factors described in previous reports (5, 6). Additional corrections for decay were applied to those samples in which significant amounts of short half-life beta particle emitters were found. The findings obtained from analyzing the direct samples were supplemented with readings obtained from portable and fixed instrumentation.

The results obtained from the described efforts are presented in Sections I through VII. These sections discuss the amounts of active material discharged from plant facilities and their effect on the contamination of vegetation, air, soil, and water.

SECTION I

RADIOACTIVE CONTAMINATION IN EFFLUENT GASES

Radioactive contaminants in the separation and reactor area effluent gases released to the Hanford environs were sampled at the stacks and the stack breechings. Daily filter and scrubber samples from the separations areas were analyzed for I^{131} and $Ru^{103-106}$ activity density. Weekly filter, tritium oxide, and C^{14} -S^{35} samples were taken at the reactor areas and analyzed radiochemically. Summaries of the results obtained from measurements in each manufacturing facility are presented below.

SEPARATION AREAS

200 EAST AREA - SEMI-WORKS

Filter and scrubber samples taken from the fifty foot level of the Semi-Works stack were analyzed for total beta particle emitters. The combined results of these analyses calculated as curies per day emitted from the stack are summarized in Table I.

TABLE I

BETA PARTICLE EMITTERS DISCHARGED
FROM THE SEMI-WORKS STACK
JULY, AUGUST, SEPTEMBER
1955

Units of Curie Per Day

Month	Maximum	Average
July	1.2×10^{-2}	$<1.0 \times 10^{-3}$
August	$<1.1 \times 10^{-3}$	$<4.2 \times 10^{-4}$
September	1.7×10^{-3}	$<1.2 \times 10^{-3}$
Quarter	1.2×10^{-2}	$<9.0 \times 10^{-4}$
Last Quarter	1.9×10^{-2}	$<3.4 \times 10^{-3}$

The level of beta activity density noted in the Semi-Works effluent gases last quarter when operations were resumed at this facility, continued into the present quarter with no significant differences being recorded.

200 WEST AREA - T-PLANT

A summary of the results of I^{131} measurements at the fifty foot level of the T-Plant stack are presented in Table II.

TABLE II

IODINE-131 DISCHARGED FROM THE T-PLANT STACK

JULY, AUGUST, SEPTEMBER

1955

Unit of Curie Per Day

Month	Maximum	Average
July	2.8	0.81
August	1.6	0.48
September	8.2	1.2
Quarter	8.2	0.83
Last Quarter	14	1.3

Decreases noted last quarter in the I^{131} emission rate from the T-Plant stack continued into the present quarter. I^{131} emission from this stack is returning to more normal values after the unusually high measurements noted during the first quarter of 1955. The maximum I^{131} emission of 8.2 curies per day occurred on August 26 - 27, 1955. Without this one high result, the quarterly average would have been 0.6 curie per day.

200 WEST AREA - S-PLANT

Table III gives a summary of the results of I^{131} monitoring at the twenty foot level of the S-Plant stack.

[redacted]

TABLE III

IODINE-131 DISCHARGED FROM THE S-PLANT STACK

JULY, AUGUST, SEPTEMBER

1955

	Units of Curie Per Day	
Month	Maximum	Average
July	5.0	0.43
August	3.6	0.57
September	6.8	1.6
Quarter	6.8	0.87
Last Quarter	18	0.96

The average I^{131} emission from the S-Plant stack was slightly lower this quarter, and the maximum emission was only 6.8 curies of I^{131} per day compared to 18 curies per day last quarter. The average last quarter was weighted, however, by the one unusually high measurement and, without this value of 18 curies per day, last quarter's average would have been 0.4 curie per day with a maximum of 1.6. This quarter's results, however, included several values greater than 2 curies per day and indicated a trend toward increased emission which comparison of the average and maximum values for the two quarters does not reveal.

The results obtained from ruthenium monitoring at the S-Plant stack are summarized in Table IV.

TABLE IV

RADIOACTIVE RUTHENIUM DISCHARGED
FROM THE S-PLANT STACK
JULY, AUGUST, SEPTEMBER
1955

Month	Units of Curie Per Day	Average
July	<0.02	<0.01
August	<0.02	<0.009
September	<0.02	<0.01
Quarter	<0.02	<0.01
Last Quarter	<0.03	<0.01

Average and maximum values for ruthenium emission from the S-Plant stack continued at the low levels noted during the previous quarters with the majority of the values below the detection limit of the system.

200 WEST AREA - U-PLANT

Table V presents a summary of the results from filter monitoring at the ten foot level of the U-Plant stack.

TABLE V

RADIOACTIVE PARTICULATE MATERIALS
DISCHARGED FROM U-PLANT STACK
JULY, AUGUST, SEPTEMBER
1955

	Alpha Particle Emitters		Beta Particle Emitters		Radioactive Particle Concentrations	
	Units of 10^{-8} Curie/day		Units of 10^{-5} Curie/day		Units of 10^{5} Particles/day	
Month	Max.	Avg.	Max.	Avg.	Max.	Avg.
July	0.6	0.22	1.6	0.62	38	2.1
August	1.3	0.30	0.32	0.13	2.1	0.9
September	1.2	0.52	0.93	0.19	14	1.7
Quarter	1.3	0.37	1.6	0.26	38	1.5
Last Quarter	1.7	0.56	15	2.7	6.2	1.1

No significance was attached to any of the differences noted when average and maximum values for the present and previous quarters were compared as in Table V. Except for two unusually high measurements of gross beta activity density during the previous quarter and one high measurement of particle concentration this quarter, the figures in Table V are all of the same order of magnitude.

REACTOR AREAS

Results of measurements at the reactor area stacks for tritium oxide, C^{14}, S^{35}, and particulate materials are summarized in Tables VI through XI.

[redacted]

TABLE VI

TRITIUM OXIDE DISCHARGED FROM REACTOR STACKS

JULY, AUGUST, SEPTEMBER

1955

Units of Curie Per Day

Stack	July		August		September		Quarterly	
	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.
100-B	0.38	0.15	0.25	0.14	0.25	0.13	0.38	0.14
100-C	0.11	0.04	0.04	0.02	0.22	0.05	0.22	0.04
100-D	0.23	0.14	0.30	0.18	0.86	0.41	0.86	0.26
100-DR	0.05	0.02	0.07	0.04	0.06	0.03	0.07	0.03
100-H	0.16	0.08	0.18	0.08	0.05	0.03	0.18	0.06
100-F	0.34	0.11	0.11	0.06	0.19	0.09	0.34	0.09

TABLE VII

CARBON-14 DISCHARGED FROM REACTOR STACKS

JULY, AUGUST, SEPTEMBER

1955

Units of 10^{-3} Curie Per Day

Stack	July		August		September		Quarterly	
	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.
100-B	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5
100-C	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5
100-D	<4.5	<4.5	<4.5	<4.5	6.5	<4.5	6.5	<4.5
100-DR	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5	<4.5
100-H	<4.5	<4.5	<4.5	<4.5	5.5	<4.5	5.5	<4.5
100-F	<4.5	<4.5	9.9	<4.5	<4.5	<4.5	9.9	<4.5

TABLE VIII

SULFUR-35 DISCHARGED FROM REACTOR STACKS

JULY, AUGUST, SEPTEMBER

1955

Units of 10^{-4} Curie Per Day

Stack	July		August		September		Quarterly	
	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.
100-B	6.7	<4.5	11	<4.5	7.9	<4.5	11	<4.5
100-C	<4.5	<4.5	< 4.5	<4.5	<4.5	<4.5	< 4.5	<4.5
100-D	<4.5	<4.5	< 4.5	<4.5	8.4	4.5	8.5	<4.5
100-DR	8.1	<4.5	13	7.2	8.0	<4.5	13	5.1
100-H	<4.5	<4.5	< 4.5	<4.5	<4.5	<4.5	< 4.5	<4.5
100-F	30	9.9	69	20	6.0	<4.5	69	12

TABLE IX

ALPHA PARTICLE EMITTERS DISCHARGED AS

PARTICULATES FROM REACTOR STACKS

JULY, AUGUST, SEPTEMBER

1955

Units of 10^{-7} Curie Per Day

Stack	July		August		September		Quarterly	
	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.
100-B	1.1	0.64	1.4	0.39	1.6	0.9	1.6	0.63
100-C	1.6	0.77	1.4	0.60	2.4	1.1	2.4	0.82
100-KW	7.1	2.8	4.7	1.5	3.3	3.3	7.1	2.0
100-D	2.9	1.6	1.8	0.77	3.3	1.6	3.3	1.2
100-DR	3.2	1.4	3.2	1.0	4.5	1.6	4.5	1.3
100-H	2.4	1.3	4.4	1.3	5.0	1.9	5.0	1.5
100-F	3.0	1.7	2.1	0.86	4.4	1.8	4.4	1.4

[redacted]

TABLE X

BETA PARTICLE EMITTERS DISCHARGED AS PARTICULATES FROM REACTOR STACKS JULY, AUGUST, SEPTEMBER 1955

Units of 10^{-5} Curie Per Day

Stack	July		August		September		Quarterly	
	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.
100-B	250	110	470	140	360	260	470	170
100-C	5.9	2.0	250	58	43	12	250	27
100-KW	5.8	3.1	8.9	3.7	3.2	3.2	8.9	3.5
100-D	470	120	340	280	390	290	470	250
100-DR	1.0	0.51	19	4.9	1.0	0.7	19	2.2
100-H	7.4	0.36	8.0	4.6	130	35	130	14
100-F	230	160	250	160	250	100	250	140

TABLE XI

RADIOACTIVE PARTICLES DISCHARGED FROM REACTOR STACKS JULY, AUGUST, SEPTEMBER 1955

Units of 10^{5} Particles Per Day

Stack	July		August		September		Quarterly	
	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.
100-B	23	8.5	31	16	*	7.3	31	11
100-C	36	19	52	34	26	14	52	20
100-KW	1.2	0.7	1.3	0.9	*	3.6	3.6	1.1
100-D	0.9	2.0	*	*	*	*	*	*
100-DR	1.7	0.6	220	55	3.8	1.4	220	18
100-H	1.5	1.0	7.1	3.0	170	46	170	18
100-F	150	74	57	27	410	72	410	56

* The majority of the autoradiographs were occluded by a fine gray darkening which prohibited accurate measurements of the number of radioactive particles.

The total average tritium oxide emission from all reactor area stacks was 0.62 curie per day compared to a total average of 1.1 curies per day during the previous quarter. Slight decreases in tritium oxide emission were noted at all of the reactor stacks this quarter.

Occasional positive C^{14} measurements continued to be noted at random intervals and locations this quarter. The maximum measurement of 9.9×10^{-3} curie per day occurred at 100-F on August 16, 1955. Average C^{14} emission rates at all reactor area stacks were below the detection limit of 4.5×10^{-3} curie per day this quarter while emission rates of S^{35} from the reactor area stacks decreased again this quarter to values comparable with those found during 1954. Average rates from all but two of the reactor stacks, 105-DR and 105-F, were below the detection limit of 4.5×10^{-4} curie per day while all but two of the areas, 105-C and 105-H had maximum values exceeding this limit. A total of 16 positive measurements was obtained this quarter, with the maximum of 6.9×10^{-3} curie per day occurring at 105-F area on August 2, 1955.

In all but the few instances, noted below, there were no significant changes in the activity density of alpha and beta particle emitters discharged as particulates from the reactor area stacks. The results from 100-KW show an increase of doubtful significance since last quarter's results were based on a limited number of samples. At 105-C area, the activity density from beta particle emitters increased from the previous quarter average of 1.1×10^{-5} to an average of 2.7×10^{-4} curie per day this quarter. This latter figure is comparable with the average for the first quarter of 1955 of 1.9×10^{-4} curie per day.

Concentrations of radioactive particles in the reactor area effluent gases are reported in Table XI. Such measurements were not reported during the past two quarters since the majority of the autoradiographs of the particle filters were too dense to interpret. Starting with the fourth quarter of 1955, these filters will be changed twice per week instead of once per week in order to reduce the number of excessively dense autoradiographs obtained.

SECTION II

RADIOACTIVE CONTAMINATION ON VEGETATION

Determination of the radioactive contamination of vegetation in the environs was made by the radiochemical analysis of 2400 vegetation samples. More than 2000 of these were from the immediate environs and the remainder from off-area locations in eastern and southern Washington and northern Oregon. All samples were analyzed for I^{131} and 1300 of them were analyzed for non-volatile beta particle emitters. Fifty samples from selected locations were analyzed for alpha particle emitters.

Averages for the present and previous quarter are compared in Table I. Tables II and III show by months the average I^{131} and non-volatile beta particle contamination measured at each general location. The concentrations of alpha particle emitters on vegetation are summarized in Table IV.

At a majority of the locations sampled, the activity density of I^{131} on vegetation dropped to 2/3 to 1/4 of the average measurements from last quarter. Only minor amounts of I^{131} were measured above the Hanford tolerance limit during the quarter. The deposition patterns are illustrated by months in Figures 1, 2, and 3.

There was a general decrease in average concentration of non-volatile beta particle emitters found at all locations. This decrease, which was actually a return to normal from the high results of the previous quarter, was caused by weathering and radioactive decay of bomb fallout.

TABLE I

RADIOACTIVE CONTAMINATION ON VEGETATION

JULY, AUGUST, SEPTEMBER

1955

Units of 10^{-6} μc/gm

Location Project	No. Samples	Iodine-131 Max.	Iodine-131 Avg.	Iodine-131 Avg. Last Qtr.	Non-Volatile Beta Emitters Max.	Non-Volatile Beta Emitters Avg.	Non-Volatile Beta Emitters Avg. Last Qtr.
200 West Area	78	52	4	16	1600	89	180
200 West - Redox	25	22	4	18	80	33	95
200 West - Gate	62	83	27	37	160	54	80
Route 3	13	5	<3	41	--	--	140
Meteorology Tower	13	4	<3	16	88	46	82
Batch Plant	13	5	<3	14	94	50	93
200 East Area	51	3	<3	7	120	44	150
Near the 200 Areas	307	5	<3	7	210	44	85
North of 200 Areas	246	7	<3	5	130	36	95
South of 200 Areas	369	6	<3	6	91	36	78
PSN 50-51-61	39	<3	<3	6	58	39	67
Goose Egg Hill	97	5	<3	11	110	38	110
Rattlesnake Mountain	98	<3	<3	4	110	42	110
Wahluke Slope	144	<3	<3	6	79	39	110
Off Project							
Pasco to Ringold	13	<3	<3	<3	83	34	52
Richland	129	<3	<3	<3	60	30	49
Richland - Y	13	4	<3	<3	--	--	--
Benton City - Kiona	25	<3	<3	4	77	37	69
Kennewick Environs	181	4	<3	<3	110	27	40
Pasco Environs	137	<3	<3	4	71	32	55
Prosser to Paterson-McNary	65	<3	<3	<3	78	26	49
Eastern Washington	125	<3	<3	<3	66	29	69
So. Washington and No. Oregon	135	6	<3	<3	130	22	51

TABLE II

RADIOACTIVE CONTAMINATION FROM IODINE-131 ON VEGETATION JULY, AUGUST, SEPTEMBER 1955

Units of 10^{-6} μc/gm

Location / Project	July		August		September	
	Max.	Avg.	Max.	Avg.	Max.	Avg.
200 West Area	10	4	52	5	10	<3
200 West - Redox	6	3	22	4	5	<3
200 West - Gate	20	7	83	10	20	8
Route 3	6	5	12	5	<3	<3
Meteorology Tower	4	3	<3	<3	4	<3
Batch Plant	5	<3	3	<3	<3	<3
200 East Area	<3	<3	<3	<3	<3	<3
Near the 200 Areas	5	<3	3	<3	4	<3
North of 200 Areas	<3	<3	<3	<3	7	<3
South of 200 Areas	4	<3	<3	<3	6	<3
PSN 50-51-61	<3	<3	<3	<3	<3	<3
Goose Egg Hill	<3	<3	5	<3	5	<3
Rattlesnake Mountain	<3	<3	<3	<3	<3	<3
Wahluke Slope	<3	<3	<3	<3	<3	<3
Off Project						
Pasco to Ringold	<3	<3	<3	<3	<3	<3
Richland	<3	<3	<3	<3	<3	<3
Richland - Y	<3	<3	<3	<3	4	<3
Benton City - Kiona	<3	<3	<3	<3	<3	<3
Kennewick Environs	<3	<3	<3	<3	4	<3
Pasco Environs	<3	<3	<3	<3	<3	<3
Prosser to Paterson-McNary	<3	<3	<3	<3	<3	<3
Eastern Washington	<3	<3	<3	<3	<3	<3
So. Washington and No. Oregon	<3	<3	<3	<3	6	<3

TABLE III

RADIOACTIVE CONTAMINATION FROM NON-VOLATILE BETA PARTICLE EMITTERS ON VEGETATION

JULY, AUGUST, SEPTEMBER

1955

Units of 10^{-6} μc/gm

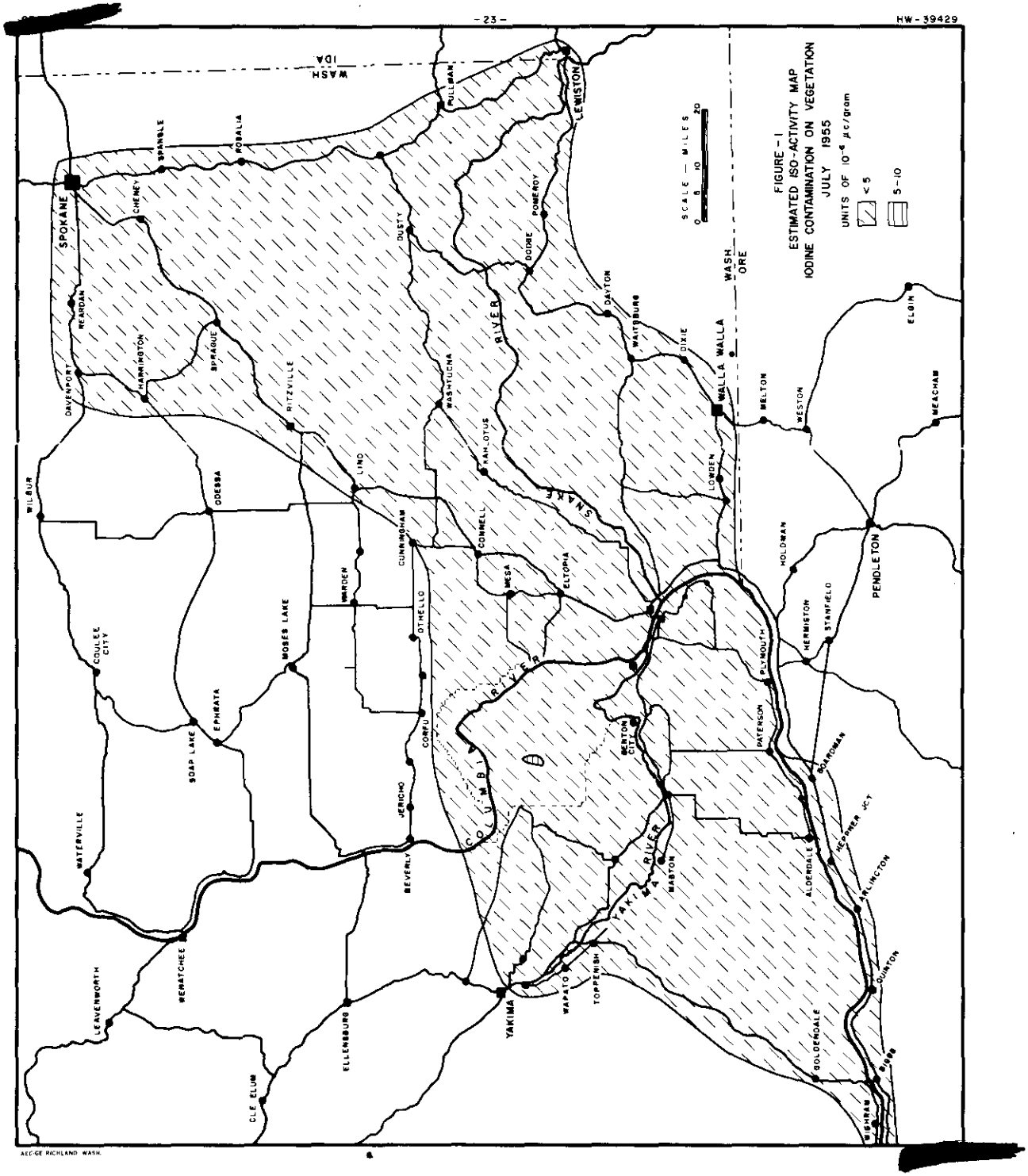
Location / Project	July		August		September	
	Max.	Avg.	Max.	Avg.	Max.	Avg.
200 West Area	110	48	400	78	1600	140
200 West - Redox	54	35	57	27	80	40
200 West - Gate	140	56	96	49	160	59
Meteorology Tower	74	43	81	42	88	54
Batch Plant	82	67	53	41	94	46
200 East Area	120	50	100	41	81	43
Near the 200 Areas	200	52	95	42	72	39
North of 200 Areas	99	41	81	36	130	32
South of 200 Areas	80	37	91	35	89	34
PSN 50-51-61	58	42	48	39	52	35
Goose Egg Hill	110	48	61	33	68	39
Rattlesnake Mountain	110	55	87	40	58	36
Wahluke Slope	75	45	79	36	70	37
Off Project						
Pasco to Ringold	83	41	69	32	64	31
Richland	60	35	34	28	39	27
Benton City - Kiona	69	39	77	39	39	32
Kennewick Environs	110	42	30	19	32	20
Pasco Environs	71	41	57	32	50	22
Prosser to Paterson-McNary	78	36	68	22	36	21
Eastern Washington	130	42	57	28	66	30
So. Washington and No. Oregon	36	22	37	16	57	29

TABLE IV

RADIOACTIVE CONTAMINATION FROM ALPHA PARTICLE EMITTERS ON VEGETATION JULY, AUGUST, SEPTEMBER 1955

Units of 10^{-8} µc/gm

Location	July Average	August Average	September Average	Quarter Maximum	Quarter Average
Near 200 Areas					
200 West Gate	16	13	66	66	26
Meteorology	21	50	37	93	36
Batch Plant	15	14	34	50	21
Route 4S, Mi. 4	<10	<10	13	20	<10
Route 4S, Mi. 6	<10	<10	<10	<10	<10
300 Area	<10	<10	<10	12	<10
Outlying					
Richland	<10	<10	<10	<10	<10
Pasco	<10	<10	<10	<10	<10
Benton City	<10	<10	<10	<10	<10



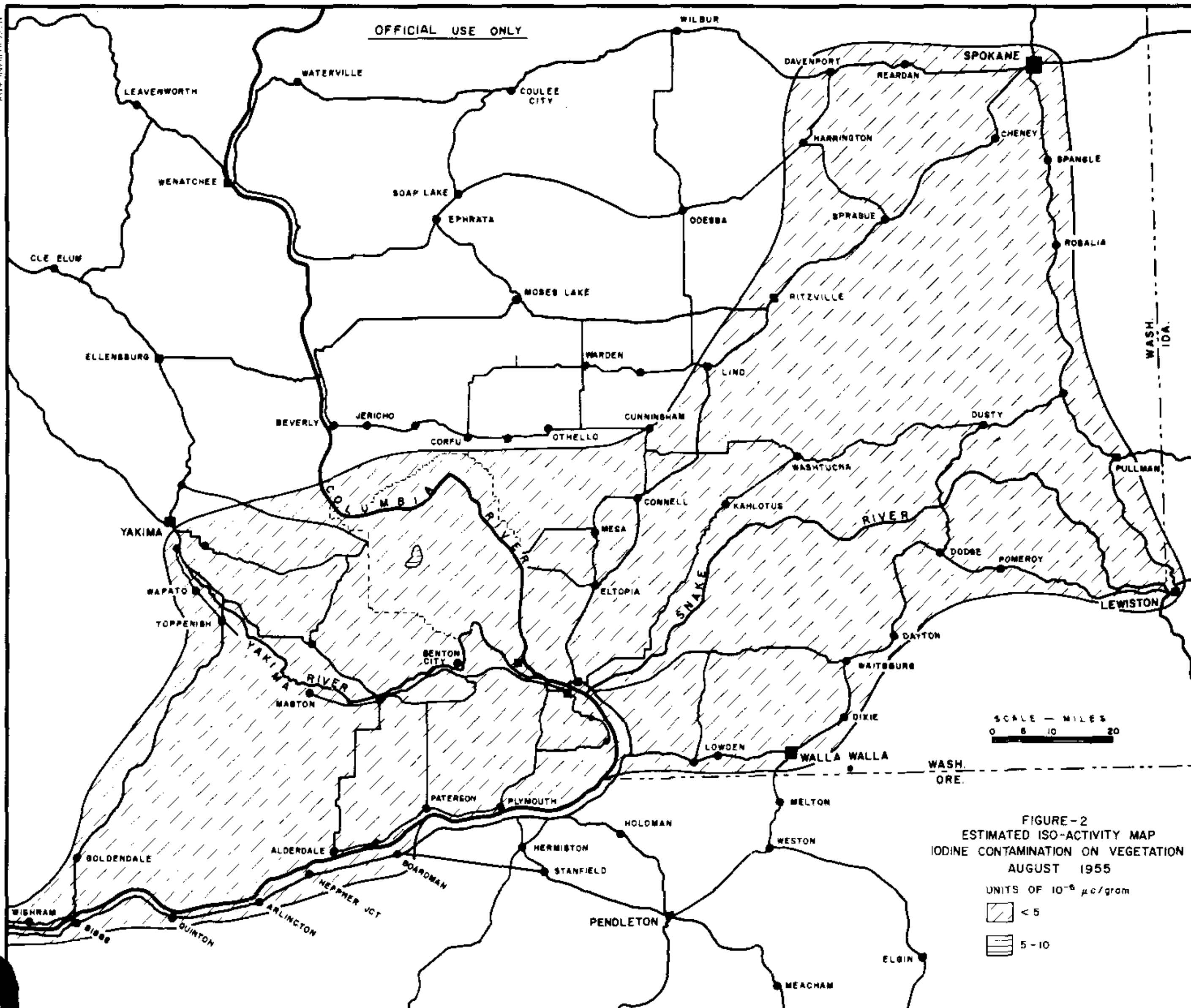
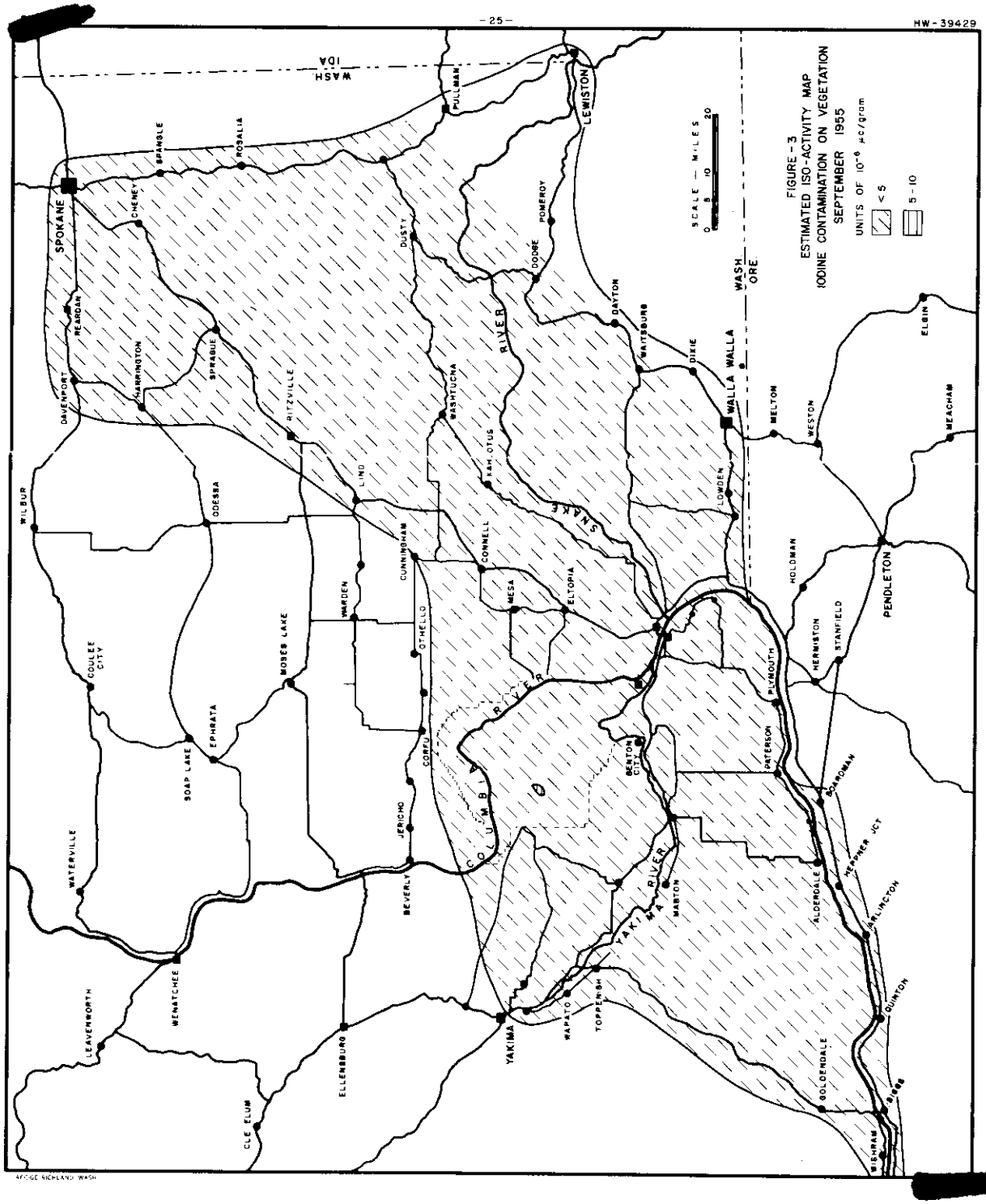


FIGURE-2
ESTIMATED ISO-ACTIVITY MAP
IODINE CONTAMINATION ON VEGETATION
AUGUST 1955



SECTION III

RADIOACTIVE CONTAMINATION IN THE ATMOSPHERE

The magnitude and extent of airborne contamination in the Hanford environs were determined from analyses of filter and scrubber samples and from data recorded in the operation of Victoreen Integrons and detachable ionization chambers. The results obtained by measurements made by each of the monitoring methods during the quarter are summarized in the accompanying tables.

Victoreen Integrons were operated continuously at stations located at the perimeter of the manufacturing areas and in residential communities neighboring the plant. Accumulated dosage readings were tabulated by eight hour intervals and calculated in units of measured dosage per 24 hours. A summary of the average dosage rates for the three month period is given in Table I.

TABLE I

AVERAGE DOSE RATES MEASURED BY VICTOREEN INTEGRONS

JULY, AUGUST, SEPTEMBER

1955

Units of mrad per 24 hours

Location	No. of Units	July	August	September	Quarterly Average
Riverland	1	1.3	0.9	1.2	1.1
100-B Area	3	0.8	0.6	0.4	0.6
100-K Area	3	0.6	0.5	1.2	0.8
100-D Area	3	1.6	0.5	0.7	0.9
100-H Area	3	0.3	0.3	0.2	0.3
White Bluffs	1	<0.1	0.8	<0.1	<0.3
100-F Area	3	6.4	6.2	3.2	5.3
Hanford	1	0.4	0.8	1.0	0.4
200 West Area	2	1.8	3.2	1.7	2.2
Redox	1	6.9	6.0	7.2	6.7
200 East Area	3	1.2	2.4	2.0	1.9
200 East Semi-Works	1	1.0	4.1	2.8	2.6
300 Area	1	1.3	2.8	2.0	2.0
1100 Area	1	1.1	4.0	0.1	1.7
Richland	1	0.3	0.2	0.3	0.3
Kennewick	1	1.0	1.7	1.9	1.5
Pasco	1	6.3	7.3	0.7	4.8
Benton City	1	0.5	0.9	2.4	1.3

The average dosage rates remained at the same level as reported for June of the last quarter.

The dosage rates present at stations located around the perimeter of the plant manufacturing areas were measured using detachable C-type ionization chambers. Duplicate instruments were used at each location with the minimum value of discharge included as the reported value. A summary of these dosage rate measurements is given in Table II.

TABLE II

AVERAGE DOSE RATES MEASURED WITH
"C" TYPE DETACHABLE IONIZATION CHAMBERS
JULY, AUGUST, SEPTEMBER
1955

Units of mrad per 24 hours

Location	July	August	September	Quarterly Average
100-B Area	0.9	0.7	0.8	0.8
100-K Area	0.8	0.6	0.4	0.6
100-D Area	1.0	0.7	0.6	0.7
100-H Area	0.6	0.6	0.6	0.6
100-F Area	0.4	0.4	0.4	0.4
200 West Area	0.5	0.4	0.4	0.4
200 East Area	0.6	0.5	0.5	0.5
200 East Semi-Works	0.8	2.1	1.8	1.6

A comparison of the above data with previous results showed that there were no significant changes in the values for the current period from similar measurements made during the past year.

The dosage rates present at intermediate locations on the project and in residential areas around the plant perimeter were measured using

detachable M- and S-type ionization chambers. Readings were obtained from these instruments at frequencies ranging from daily to weekly, and dosage rates were again reported from the chamber which showed the minimum discharge at each location. A summary of these measurements is given in Table III.

TABLE III

AVERAGE DOSE RATES MEASURED WITH "M" AND "S" TYPE DETACHABLE IONIZATION CHAMBERS JULY, AUGUST, SEPTEMBER 1955

Units of mrad per 24 hours

Location	July	August	September	Qtr. Avg.	Group Avg.
100 Areas and Environs					
Route 1, Mile 8	0.72	0.60	0.50	0.61	
Route 2N, Mile 5	0.48	0.50	0.74	0.57	
Route 2N, Mile 10	0.52	0.46	0.48	0.49	
Route 11-A, Mile 1	0.73	0.81	1.27	0.94	
Intersection Rt. 1 and Rt. 4N	0.54	0.34	0.47	0.45	
White Bluffs	0.73	0.54	0.65	0.64	
Hanford 614 Building	1.09	0.72	0.38	0.73	
Military Camp PSN 3	0.73	0.64	1.04	0.80	
Military Camp PSN 21	0.76	1.03	0.91	0.90	0.68
200 Areas and Environs					
Route 3, Mile 1	0.64	0.54	0.64	0.61	
Route 2S, Mile 4	0.79	0.76	0.66	0.74	
Route 4S, Mile 2.5	0.55	1.98	1.74	1.42	
Route 4S, Mile 4.5	1.10	0.87	0.81	0.93	
Route 4S, Mile 6	1.02	0.51	1.53	1.02	
Route 4S, Mile 10	1.41	0.96	0.86	1.08	
Route 10, Mile 1	2.32	1.29	1.66	1.76	
Route 10, Mile 3	2.17	2.85	3.11	2.71	
Route 11-A, Mile 6	1.97	0.48	0.45	0.97	
Batch Plant	1.47	1.66	1.82	1.65	
Redox Area	0.89	0.81	0.72	0.81	
Military Camp PSN 42	0.59	0.92	0.52	0.68	

TABLE III (contd.)

Units of mrad per 24 hours

Location	July	August	September	Qtr. Avg.	Group Avg.
200 Areas and Environs (contd.)					
Military Camp PSN 50	1.09	1.29	0.62	1.00	
Military Camp PSN 51	1.69	1.51	2.11	1.77	
Military Camp PSN 61	1.80	1.74	0.81	1.45	
Military Camp PSN 70	1.78	1.74	0.84	1.45	1.23
300 Area and Environs					
Route 4S, Mile 16	1.25	0.99	0.75	1.00	
Route 4S, Mile 22	2.75	1.09	1.41	1.75	
300 Area	0.65	0.80	0.59	0.68	
1100 Area	0.66	0.71	0.48	0.62	
Military Camp PSN 60	0.61	1.23	0.82	0.89	0.99
Outlying					
Richland	1.01	0.74	0.74	0.83	
Benton City	0.37	0.50	0.62	0.50	
Kennewick	0.35	0.38	0.56	0.43	
Pasco	0.71	0.39	0.38	0.49	0.56

No significant differences in average dosage rates were measured at the given grouped locations compared to the values found during the previous reporting period.

The activity density of beta particle emitters in the atmosphere was measured using filters through which air was passed at flow rates of 2 to 2.5 cfm for daily or weekly periods. These samples were analyzed and counted several days after their removal from the sampling location to allow for the decay of the daughter products of the natural airborne particle emitters. A summary of the results obtained from these measurements during the period is given in Table IV.

TABLE IV

CONCENTRATIONS OF BETA PARTICLE EMITTERS

FILTERED FROM AIR

SINGLE UNIT MONITORS

JULY, AUGUST, SEPTEMBER

1955

Units of 10^{-4} μc/ml

Location	July	August	September	Qtr. Avg.	Weekly Max.
100 Areas and Vicinity					
100-K Area No. 1	36	45	14	33	71
100-K Area No. 2	60	78	50	64	120
100-K Area No. 3	37	32	30	33	44
100-D Area	28	38	20	29	57
100-H Area	38	13	28	25	48
Hanford	26	38	15	27	49
White Bluffs	20	30	20	24	43
200 Areas and Vicinity					
200-E Semi-Works	180	32	19	73	590
200-W West Center	36	44	30	37	56
200-W, Redox	130	66	53	77	260
Gable Mountain	27	60	28	40	86
Military Camp, PSN 50	22	< 4	14	17	49
200 West-East Center	54	86	48	64	110
300 Area	28	43	17	29	59
Outlying Areas					
1100 Area	48	50	19	40	67
Pasco	26	33	20	27	42
Benton City	22	42	21	30	65
Riverland	29	30	15	25	53

There was a general decrease in the concentrations of beta particle emitters filtered from air during the quarter in all outlying areas. Values measured near the manufacturing areas were essentially normal, with only small decreases noted. These decreases reflected a return to normal values from the probable contamination last quarter from nuclear detonations.

Additional evaluations of the concentrations of beta particle emitters in the atmosphere were made by analyzing the small air filters removed from dual monitors operated at two locations. The results of these measurements are given in Table V.

TABLE V

CONCENTRATIONS OF BETA PARTICLE EMITTERS
FILTERED FROM AIR DUAL UNIT MONITORS
JULY, AUGUST, SEPTEMBER
1955

Units of 10^{-14} μc/ml

Location	July	August	September	Qtr. Avg.	Weekly Max.
200-ESE No. 1	19	45	32	34	70
200-ESE No. 2	21	39	23	28	51
Richland No. 1	33	42	21	33	58
Richland No. 2	33	57	12	37	110

The quarterly averages shown in Table V reflect the same decreases noted in the results shown in Table IV, with the concentrations measured in Richland showing the principal change from the previous period.

The number of radioactive particles in the atmosphere was determined by autoradiographing air filters through which sample air flow rates of from 2.5 to 10 cfm were passed for periods ranging from daily to weekly. Monitoring stations were maintained throughout the immediate plant environs and at several remote locations in Washington, Oregon, Idaho, and Montana in order to evaluate particles originating both from Hanford and from outside sources. All filters were autoradiographed for seven days using Type K X-ray film. A summary of the results of measurements near the separations areas is given in Table VI; similar results of measurements made outside the separations areas and at remote locations are given in Table VII.

TABLE VI

SUMMARY OF PARTICLE CONCENTRATIONS
NEAR THE SEPARATION AREAS
JULY, AUGUST, SEPTEMBER
1955

Units of 10^{-3} particle/meter^3

Location	July	August	September	Qtr. Avg.	Last Qtr. Avg.
200-E Vicinity					
2704 Outside	17	6	10	11	41
By - SE	23	14	26	21	33
"B" Gate	33	7	12	16	51
2-EWC, 614 Building	12	4	7	7	19
2704 Inside	23	5	11	13	37
200-W Vicinity					
2701 Outside	42	56	120	77	78
2722	17	32	43	32	43
"T" Gate	19	30	14	21	33
222-T Outside	215	310	295	270	180
231	24	25	65	39	37
Redox	35	21	46	35	48
2701 Inside	50	54	70	59	64
272	39	25	37	34	48
2-WWC	14	9	18	14	35
"U" Gate	9	26	14	16	43
222-U Lab Inside	15	18	24	19	20
Meteorology Tower					
3'	8	6	6	6	19
50'	6	4	2	4	18
100'	7	5	3	5	23
150'	8	7	2	5	25
200'	11	9	3	8	30
250'	8	8	4	6	24
300'	9	4	2	5	27
350'	8	4	2	4	32
400'	10	3	2	5	32

TABLE VII

SUMMARY OF PARTICLE CONCENTRATIONS
OUTSIDE THE SEPARATION AREAS
JULY, AUGUST, SEPTEMBER
1955

Units of 10^{-3} particle/meter^3

Location	July	August	September	Qtr. Avg.	Last Qtr. Avg.
Area Locations					
100-B Area	23	2	1	8	9
100-K No. 3	11	4	2	6	12
100-D Area	16	4	1	7	13
White Bluffs	25	5	3	11	10
100-F Area	22	3	3	9	11
300 Area	2	1	1	2	2
Off Area Locations					
Benton City, Wn.	15	0.4	1	5	8
Pasco, Wn.	9	2	1	3	13
Richland, Wn.	16	4	1	6	31
Boise, Idaho	44	2	2	13	200
Klamath Falls, Ore.	15	2	1	6	58
Great Falls, Mont.	12	<1	0.3	4	60
Walla Walla, Wn.	22	2	3	9	66
Meacham, Ore.	25	1	0.1	8	36
Lewiston, Idaho	21	6	2	9	87
Spokane, Wn.	48	2	2	17	95
Kennewick, Wn.	10	3	2	5	36
Yakima, Wn.	14	1	0.3	5	17
Seattle, Wn.	2	<1	1	1	23

General decreases in particle concentration during the current period were noted for nearly all sampling locations, both near the separations areas and at remote stations. The decrease was small near the separations areas and indicate that the measurements last quarter contained probable contamination from sources other than Hanford.

[redacted]

The activity density of I^{131} in the atmosphere was determined from the radiochemical analysis of caustic scrubber solutions through which air was passed at rates of 2 to 2.5 cfm for periods ranging from one to seven days. The results obtained from these measurements are summarized in Table VIII.

TABLE VIII

CONCENTRATIONS OF IODINE-131
DETECTED BY AIR SCRUBBERS
JULY, AUGUST, SEPTEMBER
1955

Units of 10^{-12} µc/ml

Location	July	August	September	Qtr. Avg.	Weekly Max.
200 Areas and Vicinity					
200-ESE	<0.1	<0.1	0.1	<0.1	0.2
Gable Mountain	<0.1	<0.1	<0.1	<0.1	0.1
200 West East Center	0.7	0.7	1.2	0.9	2.8
200 West West Center	0.1	0.2	0.1	0.1	0.3
200 East Semi-Works	0.2	0.1	0.2	0.2	0.4
Redox Area	0.3	0.3	0.3	0.3	1.0
White Bluffs	<0.1	<0.1	0.1	<0.1	0.2
Outlying Area					
100-K Center K-3	<0.1	0.6	<0.1	0.2	1.4
100-H Area	<0.1	<0.1	<0.1	<0.1	0.2
300 Area	<0.1	<0.1	<0.1	<0.1	<0.1
1100 Area	<0.1	<0.1	<0.1	<0.1	<0.5
Richland	<0.1	<0.1	<0.1	<0.1	<0.1
Pasco	<0.1	<0.1	<0.1	<0.1	<0.1
Benton City	<0.1	<0.1	<0.1	<0.1	<0.1

The average activity densities of I^{131} in air compared favorably at all locations with those previously reported and indicate normal operations for the quarter. The concentrations measured in the surrounding residential areas remained generally below detection limits.

[redacted]

The concentration of alpha particle emitters in the atmosphere was determined by counting the same filters used for the beta particle emitter measurements which were summarized in Tables IV and V above. A summary of the alpha measurements is given in Table IX.

TABLE IX

CONCENTRATIONS OF ALPHA PARTICLE EMITTERS
FILTERED FROM AIR
JULY, AUGUST, SEPTEMBER
1955

Units of 10^{-15} μc/ml

Location	Samples	Weekly Maximum	Quarterly Average
200 West West Center	12	5	< 4
200 East Semi-Works	13	< 4	< 4
Gable Mountain	13	4	< 4
Pasco	13	9	4
300 Area	12	7	< 4
100-D Area	13	17	< 4
Benton City	13	< 4	< 4
Hanford	13	< 4	< 4
White Bluffs	13	5	< 4
1100 Area	13	10	< 4
200 West, Redox Area	12	< 4	< 4
100-H Area	13	< 4	< 4
Riverland	13	< 4	< 4
Military Camp, PSN 50	6	< 4	< 4
200 West East Center	13	5	< 4
100-K No. 1	13	10	< 4
100-K No. 2	13	16	5
100-K No. 3	13	8	< 4
Dual Unit Monitors			
200 ESE No. 1	12	6	< 4
200 ESE No. 2	13	7	< 4
Richland No. 1	13	5	< 4
Richland No. 2	8	15	4

The average concentrations of alpha particle emitters compared favorably with previous results, and are indicative of normal operations at Hanford.

SECTION IV

RADIOACTIVE CONTAMINATION IN HANFORD WASTES

The magnitude and extent of radioactive contamination in Hanford wastes were determined from the results of nearly 1900 measurements. Solid and liquid samples were obtained directly from open waste areas at frequencies varying from daily to monthly; these samples were analyzed radio-chemically for the activity densities of gross alpha and beta particle emitters. Specific isotopic analyses were performed when measurements indicated unusual contamination and were carried out routinely on samples from locations which have a high probability of containing unusual quantities of certain contaminants. These measurements were supplemented with data obtained from portable instrument surveys around the perimeter of the waste storage areas and over open terrain at various locations on the plant.

The results of these measurements are summarized for each of the manufacturing areas.

100 AREA WASTE

Radioactive contamination discharged to the Columbia River from the reactor areas was determined by analyzing samples collected daily from the outlets of the coolant water retention basins. The samples were analyzed within twelve hours after collection and the measured counting rates of beta particle emitters were corrected for decay. A summary of the activity of beta particle emitters discharged to the river per unit of time is given in Table I.

TABLE I

BETA PARTICLE EMITTERS DISCHARGED TO RIVER
IN REACTOR EFFLUENT WATER
JULY, AUGUST, SEPTEMBER
1955

Units of 10^3 μc/sec

Location	No. Samples	July Max.	July Avg.	August Max.	August Avg.	September Max.	September Avg.	Quarterly Max.	Quarterly Avg.
100-B Area	78	21	17	13	12	18	12	21	13
100-C Area	81	37	25	50	24	25	21	50	23
100-D Area	70	14	13	37	17	16	13	37	15
100-DR Area	106	26	15	16	14	18	11	26	13
100-H Area	78	16	11	14	8.9	12	8.7	16	9.3
100-F Area	82	35	28	48	30	40	25	48	27
100-KW Area	84	6.2	5.1	6.7	5.3	7.8	6.0	7.8	5.6
100-KE Area	102	8.0	6.0	7.3	5.8	29	7.8	29	6.5

A comparison of the total activity of beta particle emitters discharged to the river during this period with the results of similar measurements obtained during the previous quarter showed that significant decreases in the activity admitted to the river occurred at all of the older areas except 100-F which remained the same. The 100-KE and 100-KW areas did not show the decrease because of rising power levels. The decreases can be ascribed to the expected improvement in coolant water quality following the completion of the spring "run-off" season.

The average activity of alpha particle emitters in reactor effluent water entering the river was less than 1×10^{-2} μc/sec at all areas. Individual samples showed trace alpha particle emitter discharge at various times during the quarter with values indicating contaminants in the range of 1×10^{-2} to 5×10^{-2} μc/sec.

No positive uranium measurements were found in 169 samples analyzed specifically for uranium during the quarter.

Two of the 42 reactor effluent samples which were analyzed for plutonium showed values above 3×10^{-9} μc/ml. The significant activities discharged were 3.7×10^{-2} and 6.3×10^{-2} μc/sec with the maximum discharged to the river from 107-KE Basin on July 6.

Significant quantities of polonium were found in samples of effluent water from each of the reactors except 100-KE and 100-KW. The measured discharge varied from 2×10^{-3} to 1.2×10^{-2} μc/sec with the maximum discharge occurring from the 107-DR Basin on July 6.

The activity density of I^{131} in waste discharged to the Columbia River from the Biology Farm at 100-F Area was measured by analyzing composite samples collected from the sump in the waste discharge line. An average of 30 μc/day were discharged to the river during the quarter, a value similar to the discharge rates of the previous reporting periods.

200 AREA WASTES

Liquid and solid samples were collected directly from the waste sources in the separations areas and analyzed for gross alpha and beta particle emitters. A summary of the results is given in Table II.

TABLE II

RADIOACTIVE CONTAMINATION IN 200 AREA WASTE SYSTEMS

JULY, AUGUST, SEPTEMBER

1955

Liquid Samples

Location	No. Samples	Alpha Particle Emitters Units of 10^{-8} µc/ml Maximum	Alpha Particle Emitters Units of 10^{-8} µc/ml Average	Beta Particle Emitters Units of 10^{-7} µc/ml Maximum	Beta Particle Emitters Units of 10^{-7} µc/ml Average
T-Ditch	13	<0.5	<0.5	860	140
T-Swamp	35	<0.5	<0.5	1100	120
U-Swamp	25	7.0	1.1	190	37
Laundry Ditch	25	69.0	5.5	6.8	3.0
231 Ditch	26	3.6	0.7	1.9	0.4
200-E "B" Ditch	18	<0.5	<0.5	25	2.8
200-E "B" Swamp	4	<0.5	<0.5	0.73	0.57
234-35 Ditch	13	4.3	0.7	17	1.5
U-Ditch Inlet	12	<0.5	<0.5	15	3.4

Solid Samples

		Units of 10^{-6} µc/gm		Units of 10^{-5} µc/gm	
T-Ditch	12	5.6	2.2	8300	1700
T-Swamp	17	25	3.5	770	270
Laundry Ditch	13	130	46	110	35
200-E "B" Ditch	18	160	16	190	53
200-E "B" Swamp	4	2.1	1.3	21	12
234-35 Ditch	12	3900	120	51	7.5

The various increases and decreases noted when comparing the measurements summarized in Table II with the data collected during the preceding period were caused by the normally wide variation of concentrations in the waste systems. The results from specific analyses of 200 Area Waste for uranium are reported in Table III.

TABLE III

RADIOACTIVE CONTAMINATION IN 200 AREA WASTE SYSTEMS
JULY, AUGUST, SEPTEMBER
1955

Liquid Samples

Location	No. Samples	Uranium Units of 10^{-9} µc/ml Maximum	Uranium Units of 10^{-9} µc/ml Average
"U" Swamp Inlet	13	69	6
"U" Swamp West Side	12	97	20
231 Ditch Pipe Outlet	13	54	5
Laundry Ditch Inlet	13	840	66
Laundry Ditch - 600 Ft.	13	700	69

Solid Samples

		Units of 10^{-6} µc/gm	
"B" Ditch Inlet	12	400	58
234-235 Ditch Pipe Outlet	9	3	1
"B" Swamp North Side	2	3	2
Laundry Ditch Inlet	11	99	47

The values listed in Table III for uranium in liquid and solid waste appear to be normal when compared with values obtained during previous quarters.

Portable instrument surveys using GM type meters were performed at the perimeter of all open waste zones in the separations areas. Counting rates obtained over mud showed values ranging from 200 to 40,000 c/m at 200 West Area locations, while all 200 East locations showed counting rates of less than 2,000 c/m above background.

Readings obtained over the waters at the edge of the swamps and ditches ranged from 200 to 25,000 c/m at 200 West Area with background readings obtained in 200 East.

300 AREA WASTE

Radioactive contamination in waste in the 300 Area was measured in samples collected directly from the north pond inlet. Table IV summarizes the results obtained from the radiochemical analyses for alpha particle emitters, beta particle emitters, uranium, and plutonium.

TABLE IV

RADIOACTIVE CONTAMINATION IN 300 AREA POND INLET
JULY, AUGUST, SEPTEMBER
1955

Liquid Samples	No. Samples	Activity Density Units of 10^{-8} μc/ml Maximum	Average
Beta Particle Emitters	56	830	64
Alpha Particle Emitters	57	2700	140
Uranium	57	520	120
Plutonium	53	3.3	< 1.5

Individual samples from the 300 Area pond inlet varied widely in activity density as was expected in this waste stream. The values are in the same range as those obtained in earlier quarters.

ENVIRONS - GROUND CONTAMINATION

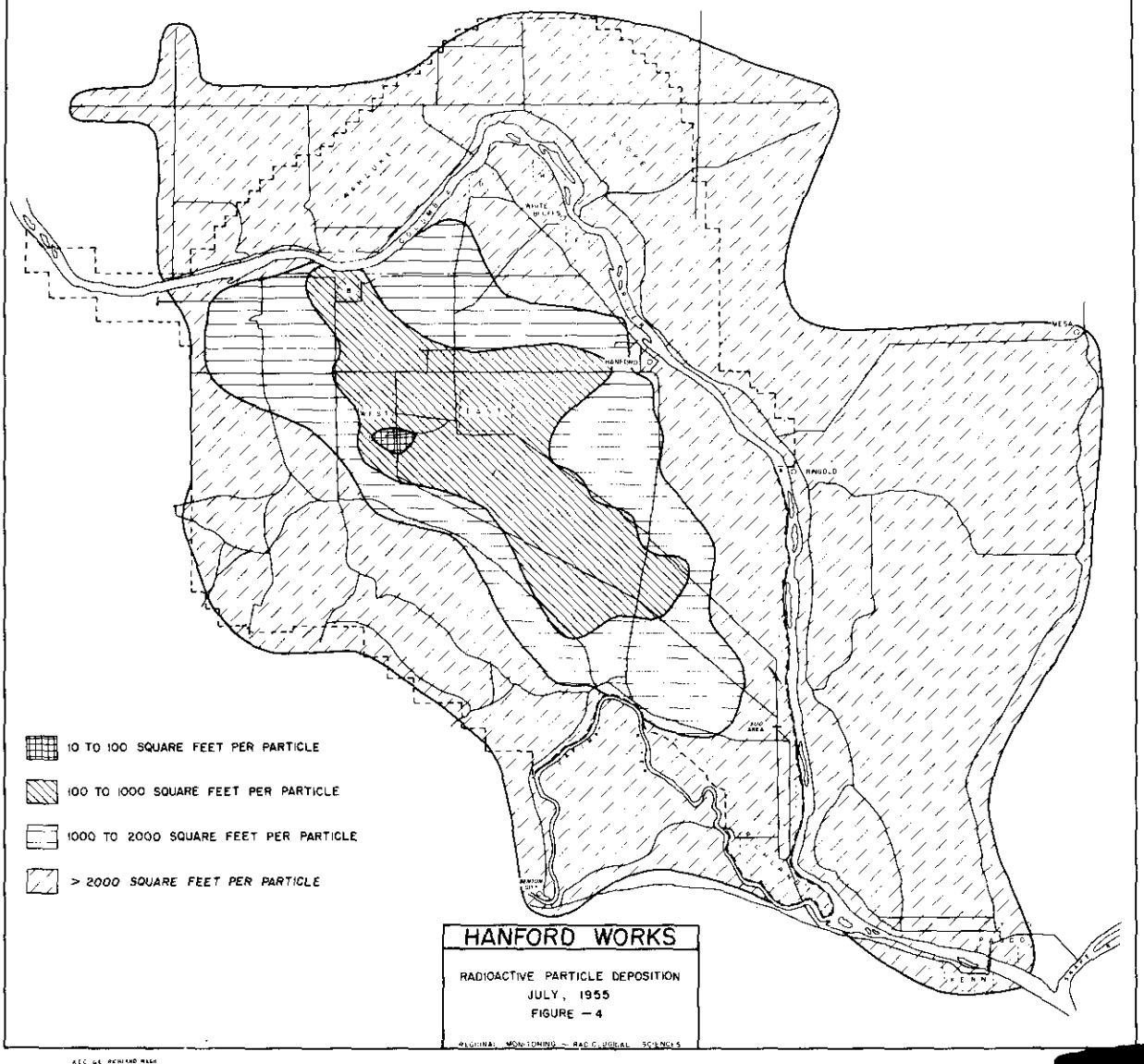
Ground surveys of control plots around Redox were continued throughout the quarter at a reduced frequency. The index average 0.50 compared to 0.85 for the last quarter. The probable causes for this significant decrease include radioactive decay and the effects of rain, wind, and other meteorological phenomena.

Ground surveys were completed each month along the side of roads on and adjacent to the project with 2,000 square feet surveyed at one-mile intervals. The patterns of particle frequencies found during these surveys

in July, August, and September are shown in Figures 4, 5, and 6.

Ground surveys of selected locations in the Tri-City Area showed average frequency of particles detectable by portable instruments of one particle per 4,500 square feet. The particle frequency was not significantly different from that reported for the preceding quarter.

The detection of low level particles by collection on glass wool and subsequent autoradiographs was continued with normal values obtained except around the B-Y Tank Farm. A tank overflowed during the week of September 14 to September 21 and caused local ground contamination. The highly contaminated ground was removed for disposal during a period of moderate wind and caused the high results of 330 particles per square foot with an average activity of 40 d/m on one glass wool pad. A ground survey of the area showed no significant increase in particles detectable by portable instruments.

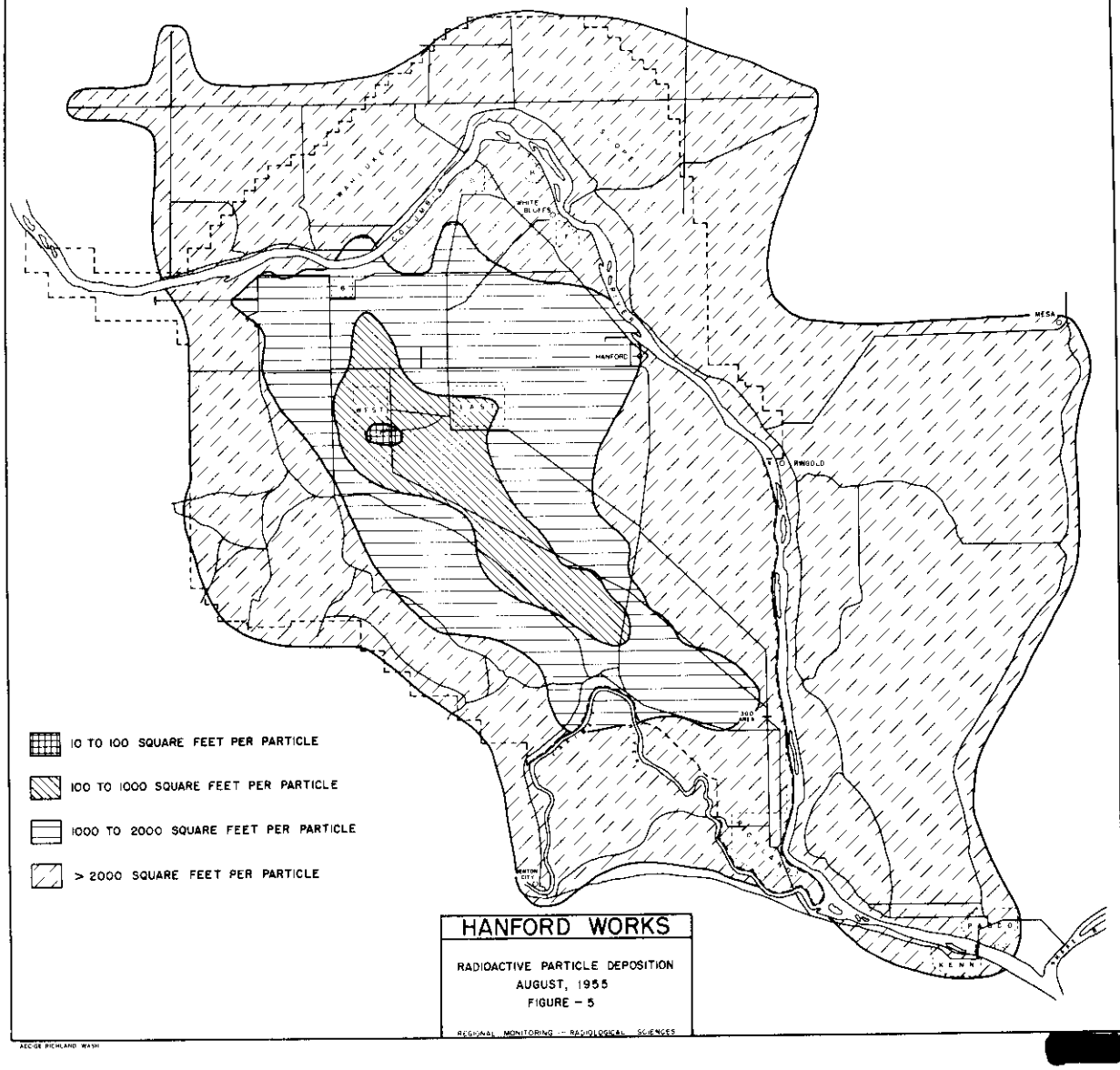


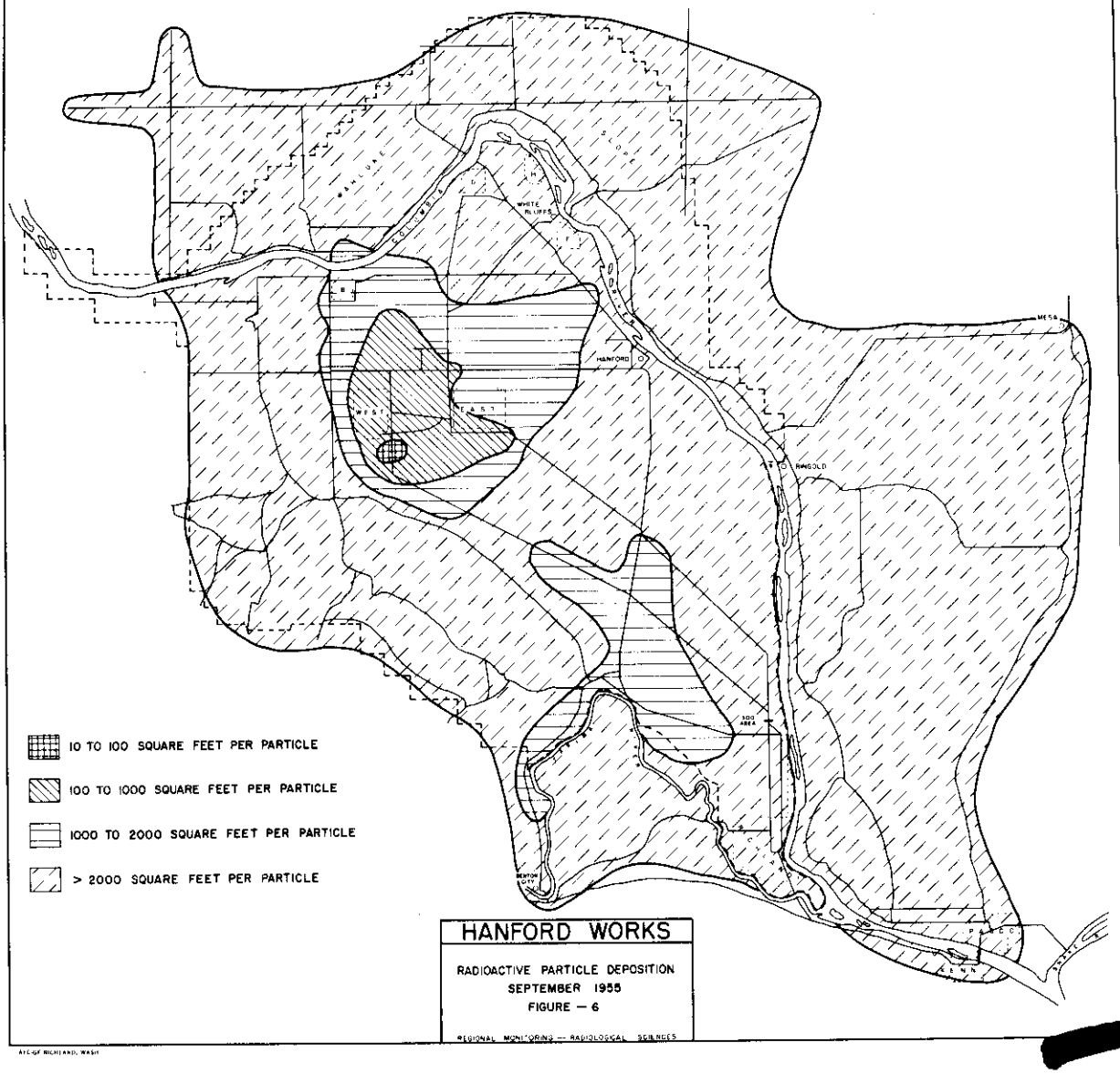
HANFORD WORKS

RADIOACTIVE PARTICLE DEPOSITION
JULY, 1955
FIGURE — 4

REGIONAL MONITORING — RADIOLOGICAL SCIENCES

AEC GE RICHLAND WASH





HANFORD WORKS

RADIOACTIVE PARTICLE DEPOSITION
SEPTEMBER 1955
FIGURE — 6

REGIONAL MONITORING — RADIOLOGICAL SCIENCES

AEC-GF RICHLAND, WASH

SECTION V

RADIOACTIVE CONTAMINATION IN THE COLUMBIA RIVER AND RELATED WATERS

A total of 610 samples of water was collected from the Columbia, Yakima, and Snake Rivers to determine the contamination resulting from the discharge of reactor cooling water to the Columbia River. Daily and weekly 500 ml samples were collected at Hanford works and downstream to McNary Dam; monthly one gallon samples were collected from the Columbia River between McNary Dam and Portland. All samples were analyzed for gross beta and alpha particle emitters.

The activity density of alpha particle emitters in the river water sampled was below the detection limit of 5×10^{-9} μc/ml throughout the quarter; activity density of beta particle emitters is summarized in Table I.

TABLE I

CONCENTRATION OF BETA PARTICLE EMITTERS IN RIVER WATER

JULY, AUGUST, SEPTEMBER

1955

Units of 10^{-8} μc/ml

Location	July Avg.	Aug. Avg.	Sept. Avg.	Qtr. Avg.	Last Qtr. Avg.	Max. This Qtr.
Columbia River						
Will Ranch	< 5	< 5	< 5	< 5	< 5	5
181-B Area	< 5	< 5	< 5	< 5	< 5	< 5
181-C Area	< 5	< 5	< 5	< 5	< 5	9
Allard Station	6	< 5	12	7	13	21
181-KW Area	17	56	160	85	210	330
181-KE Area	20	37	140	73	150	330
181-D Area	110	220	510	300	600	830
181-H Area	140	230	800	420	760	1200
Below 100-H Area	2500	710	1000	1400	1100	3000
181-F Area	370	570	1200	730	1400	1500
Below 100-F Area	510	520	850	620	1200	1600
Hanford So. Bank	550	990	1400	990	1500	2600
Hanford Middle	300	680	1200	730	1300	2400
Hanford No.Bank	130	360	530	350	640	910
300 Area	320	340	480	380	630	780
Byers Landing	120	260	390	250	380	420
Richland	230	270	250	250	390	360
Kennewick Highlands Pumping Station	150	260	230	220	250	380
Pasco Bridge (Kenn. side)	110	140	210	160	190	330
Pasco Bridge (Pasco side)	150	170	210	180	260	460
Pasco Filter Plant	130	210	260	200	300	450
Sacajawea Park	88	140	140	120	180	240
McNary Dam Pool	50	45	37	44	50	74
Below McNary Dam	34	21	22	26	36	49
Paterson	31	25	19	25	38	35

TABLE I (contd.)

Units of 10^{-8} μc/ml

Location	July Avg.	Aug. Avg.	Sept. Avg.	Qtr. Avg.	Last Qtr. Avg.	Max. This Qtr.
Snake River						
At Mouth	< 5	< 5	< 5	< 5	< 5	< 5
Yakima River						
At Mouth	< 5	< 5	< 5	< 5	< 5	6
At Horn	< 5	< 5	5	< 5	7	11
At Prosser	< 5	< 5	< 5	< 5	< 5	< 5
3000 Area Pond Inlet	< 5	< 5	< 5	< 5	< 5	< 5

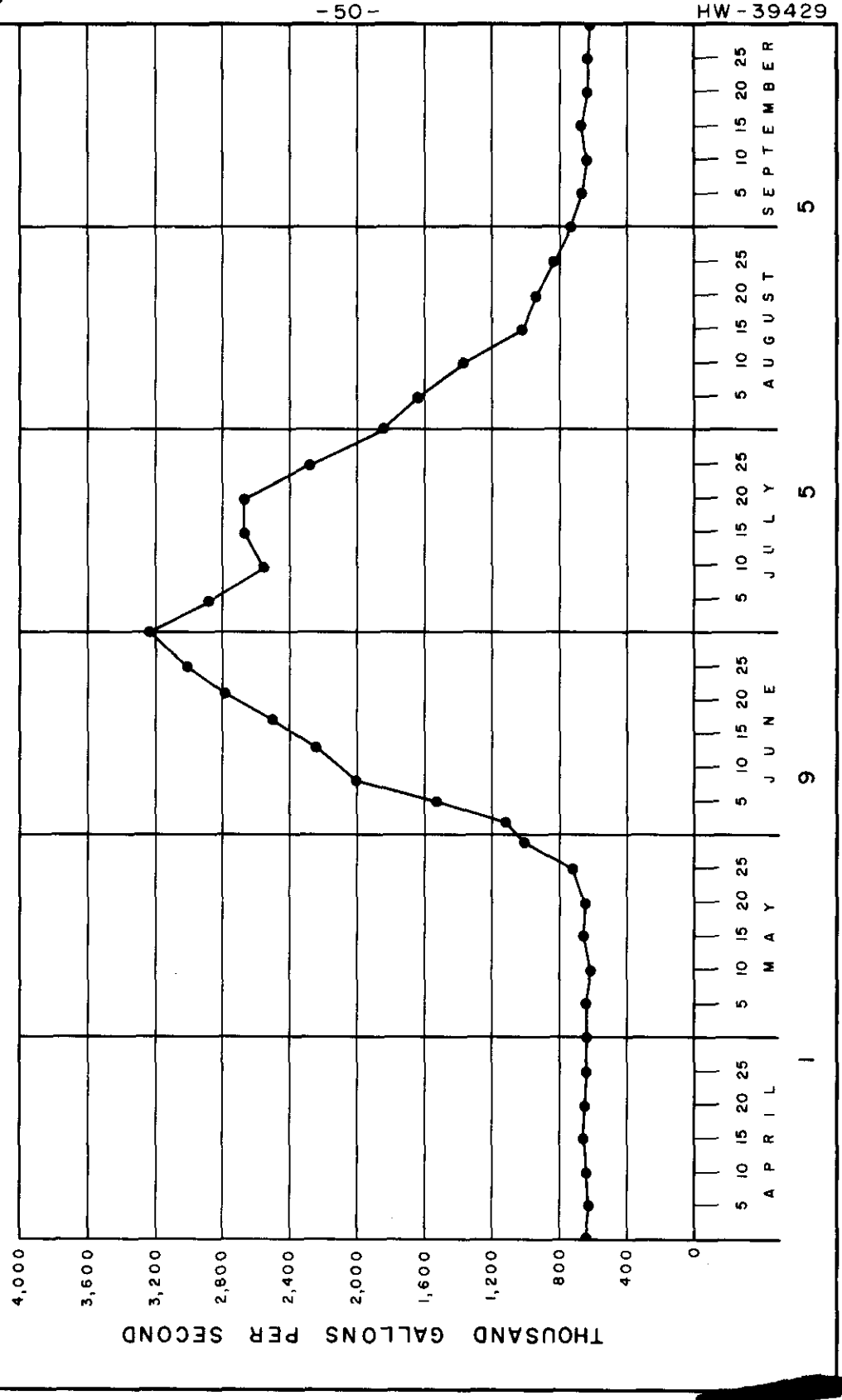
The general decreases noted in the activity density of beta particle emitters in the Columbia River this quarter are a continuation of the trend noted in the previous quarter and result from further increases in Columbia River water flow rates. The average river flow this quarter was 1.7×10^6 gps compared to 1.0×10^6 gps during the last quarter. Maximum river flow this quarter was 3.26×10^6 gps and occurred on July 1, 1955. The river flow rates for this and the previous quarter are shown in Figure 7.

The monthly one gallon samples collected from the Columbia River between Arlington and Portland revealed gross beta activity densities ranging from 3×10^{-8} to 2×10^{-7} μc/ml. These values are only slightly lower than those found during the previous quarter when the range was 3×10^{-8} to 3×10^{-7} μc/ml. The maximum measurements for July, August, and September were 2.2×10^{-7}, 1.3×10^{-7}, and 9×10^{-8} μc/ml, respectively. The first two maxima occurred at the Maryhill Ferry, while the latter occurred at Arlington; these were the most upstream locations sampled on the monthly, one gallon basis.

Twelve water samples collected from the south bank of the Columbia River at the Hanford Ferry landing were analyzed for the activity density

FIGURE – 7

COLUMBIA RIVER FLOW
JULY – AUGUST – SEPTEMBER



AEC-GE RICHLAND, WN.

of I^{131}. Average and maximum results for the present quarter were 3×10^{-8} and 1.4×10^{-7} μc/ml, respectively, compared to values of 9×10^{-8} and 3.0×10^{-7}, respectively, obtained during the previous quarter. Decreases resulted from the increased river flow as noted above.

Measurements of the travel time of the Columbia River from 100-B to Pasco by float methods continued this quarter. Minimum times measured were 11.2 hours at 2.7×10^{6} gps, 13.8 hours at 1.4×10^{6} gps, and 18.7 hours at 0.8×10^{6} gps.

A total of 343 river mud samples was collected from the Columbia River and nearby tributaries for measurement of gross alpha and beta particle emitters. All alpha particle emitter concentrations were below the detection limit of 3×10^{-6} μc/gm.

Table II summarizes the results of the gross beta activity density measurements.

[redacted]

TABLE II

CONCENTRATION OF BETA PARTICLE EMITTERS
IN RIVER MUD SAMPLES
JULY, AUGUST, SEPTEMBER
1955
Units of 10^{-5} μc/gm

Location	July Avg.	Aug. Avg.	Sept. Avg.	Qtr. Avg.	Last Qtr. Avg.	Max. This Qtr.
Columbia River						
Wills Ranch						
Shore	3.3	3.1	4.0	3.5	2.9	5.2
5' Out	2.8	2.9	3.2	3.0	3.5	4.2
Allard Station						
Shore	2.7	2.7	3.4	3.0	14	4.1
5' Out	2.6	2.9	3.4	3.0	4.4	3.9
100-H Area						
Shore	7.4	18	11	12	13	26
5' Out	7.5	13	9.4	10	9.3	19
100-F Area						
Shore	8.8	8.2	10	9.2	11	20
5' Out	10	8.3	9.4	9.4	30	20
Hanford Ferry						
So. Shore	2.3	3.9	6.6	4.4	4.9	7.9
5' Out	2.8	8.0	5.8	5.5	9.5	11
300 Area						
Shore	4.3	6.3	6.2	5.6	5.0	13
5' Out	4.3	6.5	12	7.9	4.4	18
Byers Landing						
Shore	3.1	4.2	5.2	4.3	3.3	12
Richland						
Shore	3.0	4.7	3.8	3.8	5.4	6.0
5'	4.1	7.6	6.2	6.0	7.0	10
Kennewick Highlands Pumping Station						
Shore	2.0	2.9	3.1	2.7	2.7	5.1
5' Out	2.8	6.5	3.3	4.4	3.0	18
Pasco-Kennewick Bridge (Kenn. Side)						
Shore	2.6	2.6	3.5	2.9	3.0	4.4
5' Out	3.3	4.0	3.2	3.5	3.3	5.1

Location	July Avg.	Aug. Avg.	Sept. Avg.	Qtr. Avg.	Last Qtr. Avg.	Max. This Qtr.
Sacajawea Park						
5' Out	3.6	2.2	3.3	3.0	3.6	3.6
McNary Dam Pool	8.0	8.2	9.0	8.3	8.8	14
Below McNary Dam						
5' Out	2.0	1.8	3.3	2.5	2.4	5.4
Paterson						
5' Out	3.3	4.8	4.2	4.0	2.9	6.5
Snake River						
Near Mouth						
5' Out	2.6	2.4	3.7	2.8	2.7	4.6
Yakima River						
Horn						
Shore	2.7	2.0	2.3	2.3	2.4	3.8
5' Out	2.5	2.3	2.0	2.3	1.8	3.6
Prosser						
5' Out	1.9	1.5	2.4	1.9	1.8	3.9

The unusually high measurements obtained at Allard Station and below 100-F Area last quarter were not repeated this quarter, and the values returned to those normally expected for these locations. All other values were in the normal range of fluctuations and no significance was attached to the slight differences between the average values for the past and present quarters.

Nearly 150 samples of raw water were collected from the 183 and 283 Buildings in the reactor and separation areas for gross alpha and beta analysis. The activity density from gross alpha emitters was below the detection limit of 5×10^{-9} μc/ml in all of the samples. Table III is a summary of the results of the gross beta particle emitter analysis.

[redacted]

TABLE III

CONCENTRATIONS OF BETA PARTICLE EMITTERS IN RAW WATER

RIVER EXPORT LINE

JULY, AUGUST, SEPTEMBER

1955

Units of 10^{-8} µc/ml

Location	July Avg.	Aug. Avg.	Sept. Avg.	Qtr. Avg.	Last Qtr. Avg.	Max. This Qtr.
183 Bldg., 100-B Area	< 5	< 5	< 5	< 5	< 5	< 5
183 Bldg., 100-C Area	< 5	< 5	< 5	< 5	< 5	< 5
183 Bldg., 100-D Area	19	49	150	69	120	200
183 Bldg., 100-DR Area	28	29	170	68	130	210
183 Bldg., 100-F Area	86	80	220	120	190	230
183 Bldg., 100-H Area	52	100	190	110	190	230
183 Bldg., 100-KW Area	< 5	12	59	21	52	74
183 Bldg., 100-KE Area	< 5	13	65	23	44	93
283 Bldg., 200 East	< 5	5.2	6.7	5.1	43	16
283 Bldg., 200 West	< 5	< 5	8.4	4.4	67	27

The raw water samples represent water just prior to purification for drinking purposes and its activity follows fluctuations in the gross beta activity density of the river water from which it is derived. The decreases for this quarter, noted in Table III, were therefore expected on the basis of increased river flow rates and the corresponding decreases in the river activity density.

SECTION VI

RADIOACTIVE CONTAMINATION IN RAIN

A total of 93 rain samples was analyzed during the quarter to determine the activity density of beta particle emitters in rain. Rainfall occurred during July and September, but there was no rainfall during August. Table I summarizes the precipitation measurements made by Meteorology personnel at the Meteorology Tower near 200 West Area.

TABLE I

PRECIPITATION MEASURED AT METEOROLOGY STATION
JULY, AUGUST, SEPTEMBER
1955

Units - Inches

Year	July	August	September	Quarterly Total
1952	Trace	0.08	0.08	0.16
1953	Trace	0.96	0.13	1.09
1954	0.22	0.42	0.51	1.15
1955	0.57	0.00	0.77	1.34

The results obtained from radiochemical analysis of the rain are given in Table II.

[redacted]

TABLE II

CONCENTRATIONS OF BETA PARTICLE EMITTERS IN RAIN

JULY, AUGUST, SEPTEMBER

1955

Units of 10^{-6} μc/ml

Location	No. Samples	Maximum	Weighted Average
In 200 East Area	12	1.6	<1.0
250' E of stack	4	<1.0	<1.0
2000' E of stack	4	1.2	<1.0
3500' SE of stack	4	1.6	<1.0
In 200 West Area	19	22.0	3.7
1000' E of stack	3	2.7	1.8
7000' E of stack	4	11	5.0
8000' SE of stack	4	6.1	3.2
4900' SE of stack	4	6.0	2.9
Redox Area	4	22	6.3
100 Area Environs	20	3.6	<1.0
100-B SE	3	1.5	<1.0
100-D SW	3	<1.0	<1.0
100-F SW	3	<1.0	<1.0
Hanford, 614 Bldg.	4	3.6	<1.0
White Bluffs	4	1.7	<1.0
100-H Area SE	3	<1.0	<1.0
Perimeter Locations	16	5.3	<1.0
700 Area	4	<1.0	<1.0
Pasco H and R	7	2.2	<1.0
Benton City	3	5.3	<1.0
Riverland	1	<1.0	<1.0
1100 Area, 614 Bldg.	1	<1.0	<1.0

TABLE II (Contd.)

Units of 10^{-6} μc/ml

Location	No. Samples	Maximum	Weighted Average
Intermediate Locations	26	4.2	<1.0
Route 4S, Mile 6	4	4.2	1.1
300 Area, 614 Bldg.	4	1.2	<1.0
200 North Area, 614 Bldg.	3	<1.0	<1.0
Gable Mountain	4	2.3	<1.0
Batch Plant	4	3.4	1.2
622 Building	7	1.0	<1.0

Very significant decreases from average values for last quarter were noted in the average concentrations of beta particle emitters in rain at almost every sampling location. The absence of radioactive material from nuclear explosions in the air during any rainfall was reflected in the lower concentrations of such material in rain.

SECTION VII

RADIOACTIVE CONTAMINATION IN DRINKING WATER AND TEST WELLS

Over one thousand 500 ml samples collected from drinking water supplies and test wells were analyzed this quarter to determine the radioactive contamination in these waters. A summary of the results of the analysis of 813 drinking water samples for gross alpha and beta particle emitters is presented in Table I.

TABLE I

CONCENTRATION OF ALPHA AND BETA PARTICLE EMITTERS IN WATER SUPPLIES JULY, AUGUST, SEPTEMBER 1955

Location	No. Samples	Alpha Particle Emitters Units of 10^{-9} µc/ml Max.	Alpha Particle Emitters Units of 10^{-9} µc/ml Avg.	Beta Particle Emitters Units of 10^{-8} µc/ml Max.	Beta Particle Emitters Units of 10^{-8} µc/ml Avg.
Midway and Vicinity	45	< 5	< 5	20	< 5
100-B (San)	12	< 5	< 5	5	< 5
100-C (San)	12	< 5	< 5	11	< 5
100-K (San)	13	< 5	< 5	45	14
100-D (San)	12	< 5	< 5	90	27
100-DR (San)	12	< 5	< 5	64	21
100-H (San)	12	< 5	< 5	92	35
100-F (San)	12	< 5	< 5	100	53
White Bluffs Fire Hall	13	< 5	< 5	16	< 5
Pistol Range	12	< 5	< 5	10	< 5
251 Building	12	< 5	< 5	5	< 5
200 East (San)	38	< 5	< 5	7	< 5
200 West (San)	52	< 5	< 5	80	< 5
300 Area Wells	13	< 5	< 5	< 5	< 5
North Richland Wells	189	7	< 5	10	< 5
Byers Landing	12	< 5	< 5	11	< 5
Larson Farm	12	6	< 5	9	< 5
Richland Wells	164	13	< 5	6	< 5
Kennewick	38	< 5	< 5	45	19
McNary	13	< 5	< 5	19	< 5
Plymouth	13	< 5	< 5	< 5	< 5
Paterson	12	< 5	< 5	< 5	< 5
Enterprise	13	< 5	< 5	6	< 5
Headgate	13	< 5	< 5	< 5	< 5
Benton City	26	21	14	6	< 5
Prosser	12	< 5	< 5	7	< 5

[redacted]

As in the past, positive measurements of beta particle emitter activity density were obtained from nearly all of the drinking water supplies sampled this quarter; monthly averages ranged from (<5 to 5.3) x 10^{-8} μc/ml. Drinking water which originated from the Columbia River showed higher activity density than that which originated from wells.

Seasonal increases in Columbia River flow rates this quarter (Section V) were reflected in decreased river activity and consequently, in decreased activity density of both alpha and beta particle emitters in drinking water supplies derived from the river.

Three locations listed in Table I which had average values for alpha particle emitter activity density equal to or above the detection limit of 5 x 10^{-9} μc/ml were analyzed for uranium content.

These locations were confined to well water supplies and the uranium activity density accounted for the majority of the alpha particle emitters present.

TABLE II

CONCENTRATIONS OF ALPHA PARTICLE EMITTERS,
DRINKING WATER
JULY, AUGUST, SEPTEMBER
1955

	Alpha Particle Emitters			Uranium		
	Units of 10^{-9} μc/ml			Units of 10^{-9} μc/ml		
Location	No. Samples	Max.	Avg.	No. Samples	Max.	Avg.
Richland Well No. 12	12	10	6	13	9	6
Benton City Store	13	18	12	13	16	9
Benton City Water Company	13	21	14	13	15	11

The positive average values obtained at six other locations at various times in the past were not repeated this quarter. Of particular interest is the decrease in average alpha particle emitter activity density noted at Byers Landing this quarter. The average and maximum values for the present quarter were both less than 5×10^{-9} μc/ml compared to values of 9×10^{-9} and 6.2×10^{-8} μc/ml, respectively, obtained last quarter.

Supplemental samples collected from various stages in the water treatment process at the Pasco Filter Plant were analyzed for beta particle emitter activity density to determine the decontamination efficiency of the treatment process. Table III summarizes the results of these analyses.

TABLE III

CONCENTRATIONS OF BETA PARTICLE EMITTERS,
PASCO FILTER PLANT
JULY, AUGUST, SEPTEMBER
1955

Type Sample	Samples	Maximum	Average
Water Entering Plant From River	39	4.5×10^{-6} μc/ml	2.0×10^{-6} μc/ml
Sand (surface of sand filter	11	1.4×10^{-4} μc/gm	5.5×10^{-5} μc/gm
First Backwash Material (liquid)	12	9.1×10^{-7} μc/ml	4.3×10^{-7} μc/ml
First Backwash Material (solid)	12	2.4×10^{-2} μc/gm	7.4×10^{-3} μc/gm
Coal (surface of coal filter	10	1.7×10^{-4} μc/gm	8.1×10^{-5} μc/gm
First Backwash Material (liquid)	11	1.1×10^{-6} μc/ml	4.6×10^{-7} μc/ml
First Backwash Material (solid)	11	2.3×10^{-2} μc/gm	5.6×10^{-3} μc/gm
Water Leaving Plant	13	5.6×10^{-7} μc/ml	3.2×10^{-7} μc/ml
Foam From Sand Filter	1	3.0×10^{-3} μc/gm	3.0×10^{-3} μc/gm
Foam From Coal Filter	0		

The average values listed in Table III are slightly lower than similar values obtained during the previous two quarters because of the general decrease in river water activity density. The average decontamination factor was about 6 this quarter compared to a factor of 8 last quarter and a factor of only 2 for the third quarter of 1954.

Alpha particle emitters were detected in the solid material from the filter backwash water, but not in the liquid portion nor in the water leaving the plant. Activity density of alpha particle emitters in the coal and sand backwash solids averaged 1.4×10^{-5} and 1.2×10^{-5} μc/gm, respectively, compared to the values of 1.9×10^{-6} and 5.2×10^{-6} μc/gm, respectively, obtained last quarter.

The results of the analysis of 331 test well samples from the Hanford Works water table for alpha and beta particle emitters are summarized in Table IV for locations where either type of measurement yielded a positive average.

[redacted]

TABLE IV

CONCENTRATIONS OF ALPHA AND BETA PARTICLE EMITTERS,
TEST WELLS
JULY, AUGUST, SEPTEMBER
1955

Location	No. Samples	Alpha Particle Emitters Units of 10^{-9} µc/ml Max.	Alpha Particle Emitters Units of 10^{-9} µc/ml Avg.	Beta Particle Emitters Units of 10^{-8} µc/ml Max.	Beta Particle Emitters Units of 10^{-8} µc/ml Avg.
107-B-1	3	< 5	< 5	180	150
107-B-2	3	< 5	< 5	360	260
108-B-1	3	< 5	< 5	110	81
108-B-2	3	< 5	< 5	70	64
107-D-1	2	< 5	< 5	380	320
107-F-1	3	< 5	< 5	10	6
107-F-2	1	< 5	< 5	4300	4300
107-F-3	3	< 5	< 5	130	78
108-F-1	3	< 5	< 5	170	130
108-F-2	2	< 5	< 5	4300	3700
107-H-1	3	< 5	< 5	130	55
107-H-2	3	< 5	< 5	14	8
361-B-1	4	12	8	10	< 5
361-B-7	4	< 5	5	18	14
300 Area Well No. 1	13	82	15	< 5	< 5
300 Area Well No. 3	23	260	120	9	< 5
300 Area Well No. 4	13	260	88	< 5	< 5
303-1	13	700	270	18	6
303-2	12	330	110	12	< 5
303-3	13	1200	450	13	6
303-4	13	490	320	6	< 5
303-5	13	310	160	9	< 5
303-6	13	740	370	13	< 5
303-7	3	220	170	< 5	< 5
303-8	3	20	14	< 5	< 5
303-9	3	120	10	< 5	< 5
303-10	3	210	170	6	< 5
303-11	3	100	72	< 5	< 5
303-12	3	470	380	< 5	< 5
3000-7	3	15	8	< 5	< 5
25-80	1	< 5	< 5	8	8
321-5	4	16	12	< 5	< 5
321-6	4	27	22	6	< 5
321-8	4	12	9	5	< 5

The list of wells with positive measurements is nearly the same as that found during previous quarters. Most of the additions and deletions this quarter involve wells whose activity densities are near the detection limit. Two notable exceptions are wells 107-F-2 and 108-F-2 where unusually high beta activity densities were found this quarter; these wells and all of those in the 107, 108, and 361 series were sampled by Regional Monitoring rather than by Earth Sciences for the first time during the previous quarter. Samples from well 303-8 revealed a positive average alpha particle emitter activity density this quarter for the first time since the third quarter of 1954. Present quarter average and maximum values were 1.4×10^{-8} and 2.0×10^{-8} μc/ml, respectively, compared to similar values of 3.0×10^{-8} and 5.0×10^{-8} μc/ml obtained during the third quarter of 1954. The increasing trend in the activity density of alpha particle emitters noted during the last two quarters at wells 303-4, 303-7, and 303-11 did not continue through the present period. Average values of alpha particle emitter activity density this quarter were only one-half to one-fifth of those noted during the previous quarter.

Samples from 300 Area Wells No. 1, No. 2 and No. 4 were analyzed for Uranium; average results were 1.0×10^{-8}, 1.0×10^{-7}, and 9.4×10^{-8} μc/ml. The maximum measurement of 2.4×10^{-7} μc/ml was obtained at Well No. 4. These measurements are consistent with past results; the slight increase noted this quarter was a reflection of higher Columbia River levels which forced the contaminated water table back toward these wells.

LITERATURE CITED

1.	Members of Regional Radiation Measurements Unit	Radioactive Contamination in the Hanford Environs for the Period October, November, December 1954. April 29, 1955. HW-36505.
2.	Paas, H. J.	Radioactive Contamination in the Hanford Environs for the Period April, May, June, 1953. October 2, 1953. HW-29514.
3.	Paas, H. J.	Radioactive Contamination in the Hanford Environs for the Period January, February, March, 1953. May 22, 1953. HW-28009.
4.	Healy, J. W. R. C. Thorburn and Z. E. Carey	HI Control Laboratory Routine Chemical Procedures. July 15, 1951. HW-20136.
5.	Norton, H. T. and G. E. Pilcher	The Calculation of Beta Particle Emitter Concentration in Hanford Reactor Effluent Water, August 15, 1953. HW-27584.
6.	Schwendiman, L. C.	Standard Practices Counting Manual, January 4, 1954. HW-30492.