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HW--47941

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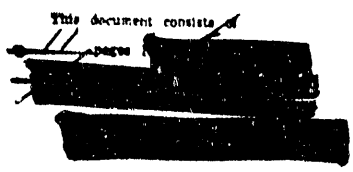
January 22, 1957



Dr. Eric Sloth
Argonne National Laboratory
P. O. Box 299
Lemont, Illinois

Dear Sir:

SPECIAL FILTER SAMPLES
OF HANFORD PROCESS EFFLUENT GASES

Forwarded under separate cover are the filter samples you requested during your visit to Hanford in December, 1956. The filters are identified by code numbers only. Included in this letter are tables explaining the sample code numbers, sampling locations, and process conditions during sampling. Also included, is a copy of the monthly and quarterly average results for Regional Monitoring's routine stack program for the fourth quarter of 1956.

200 WEST AREA - 234-5 (Z) BUILDING

Three sets of filters were operated at 234-5 Building. The first set consisted of CWS #6 filter paper, +-3/16" x 8-3/8" size, operated at 2.5 cfm (except for the main building stack - 291-Z Stack - where the flow rate was 10 cfm). The flow rate is monitored by measuring the pressure drop through the filter paper on pressure gauges. The second set of filters was taken using the special paper furnished by you. The actual flow rate for these samples is not known because the pressure drop was too low to register on the gauges. The third set of samples was taken using your paper backed up by the normal CWS #6 filter paper to provide the necessary pressure drop for flow measurement.

Table I is a summary of sample information for these three sets of filters and includes the air flow rates through the ducts or stacks being sampled.

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PNL 1-10-91

TABLE I

FILTER SAMPLES - 234-5 AND 231 BUILDINGS
DECEMBER, 1956

Number	DATE AND TIME 12/10-11/56 CWS #6 Paper	12/11-12/56 Special Paper	12/13-14/56 Both Papers	Air Sampled
308-17	1045-1120 24.58 hrs. 2.5 cfm	1335-1330 23.92 hrs. ?? cfm	1330-1330 24.00 hrs. 2.5 cfm	Exhaust air from Analytical Labs. This is major portion of the 50,000 cfm entering Room 309.
308-19	1050-1120 AM 24.50 hrs. 2.5 cfm	1332-1330 23.97 hrs. ?? cfm	1325-1325 24.00 hrs. 2.5 cfm	Inlet duct to Filter Room 309 containing 50,000 cfm of "Zone 4" exhaust air.
308-20	1050-1120 AM 24.50 hrs. 2.5 cfm	1334-1334 24.00 hrs. ?? cfm	1330-1330 24.00 hrs. 2.5 cfm	Exhaust air from Filter Room 309. Same air as per #308-19 after being filtered in Room 309.
308-21	1050-1120 AM 24.50 hrs. 2.5 cfm	1335-1335 24.00 hrs. ?? cfm	1330-1330 24.00 hrs. 2.5 cfm	Inlet duct to Filter Room 310. Shut off, but leaks 9,000 cfm of "Zone 4" air to Room 310.
308-22	1050-1130 AM 24.67 hrs. 2.5 cfm	1525-1335 22.17 hrs. ?? cfm	1330-1330 24.00 hrs. 2.5 cfm	Exhaust air from Filter Room 310. Same air as per #308-21 after being filtered in Room 310.
308-25	1100-1130 AM 24.50 hrs. 2.5 cfm	1335-1340 24.08 hrs. ?? cfm	1335-1335 24.00 hrs. 2.5 cfm	"Zone 4" exhaust air from development Lab hoods plus maintenence exhaust and miscellaneous hoods and filter boxes - 4,700 cfm.
308-38	1130-1130 AM 24.00 hrs. 2.5 cfm	1345-1345 24.00 hrs. ?? cfm	1340-1340 24.00 hrs. 2.5 cfm	Miscellaneous Zone 3 air, filter boxes - 11,400 cfm.
291-Z Stack	1115-1400 26.75 hrs. 10.0 cfm	1400-1400 24.00 hrs. ?? cfm	1400-1100 21.00 hrs. 10.0 cfm	Main 234-5 Building Stack includes all of above sampled air - 165,000 cfm.
231 Building Stack	1020-0930 AM 23.17 hrs 2.5 cfm	No Sample	No Sample	Main 231 Building Stack - 16,000 cfm.

The only process information available for these samples concerns the operations at 231 Building. This building was processing some plutonium from Redox (S) plant during December. Plans were to shut down 231 Building after December when this run was completed since Redox (S) and Purex (A) plants incorporate the 231 process steps in their own operations.

200 WEST AREA - REDOX (S) PLANT

A summary of the sampling data for filters collected at Redox is presented in Table II.

TABLE II

REDOX (S) PLANT FILTER SAMPLES
20 FOOT LEVEL OF STACK
DECEMBER, 1956

Number	DATE AND TIME On	Off	Sample CFM And Exposure Hours	REMARKS
1	0910 12-11-56	0930 12-12-56	0.368 24.33	HV-70 paper of 4" diameter exposed area used. 6,000 c/m surface reading on G.M. Meter - I-131 emission during this run was 0.61 curies.
2	0930 12-12-56	0930 12-13-56	0.342 24.00	Special paper of 4" diameter exposed area used. 2,000 c/m surface reading on G.M. Meter - I-131 emission during this run was 2.3 curies.

The exposed area, during sampling, for these filters is a 4 inch diameter circle and the normal stack flow rate at Redox facility is about 40,000 cfm (± 20%). Table III is a summary of the process conditions during the sampling periods covered in Table II.

TABLE III

REDOX (S) PLANT PROCESS CONDITIONS
12-10-56 to 12-14-56

Date	Time	Dissolver Operation
12-10-56	0000	Second cut in C-cell*
	0800	Coating removal in A-cell**
	1125	Steam turned on for first cut in A-cell
12-11-56	0015	Second cut in A-cell
	0015	Coating removal in C-cell
	0000	First cut in C-cell

TABLE III (Continued)

REDOX (S) PLANT PROCESS CONDITIONS
12-10-56 to 12-14-56

Date	Time	Dissolver Operation
12-12-56	0355	Coating removal in A-cell
	0950	Second cut in C-cell
	1105	First cut in A-cell
12-13-56	0040	Second cut in A-cell
	0315	Coating removal in B-cell
	0950	First cut in B-cell
	1950	Coating removal in C-cell
12-14-56	0100	Second cut in B-cell
	0135	First cut in C-cell

* "Cut" refers to the dissolution of part of a charge of uranium slugs in one of the three dissolver vessels (A, B, or C). There are normally two or three cuts per charge.

** "Coating Removal" is the dissolution of the aluminum jackets (or cans) from the uranium slugs in a dissolver vessel.

200 WEST AREA - TBP (U) PLANT

Only one filter was collected from U-plant on the special paper. This sample was collected from the sample line at the ten foot level of the 291-U Stack and was operated at 2.0 cfm. The exposed area of the filter was about 1-1/16" diameter. The sample was collected from 1015 on December 12, 1956 to 1100 on December 13, 1956, for a total sample run of 24.75 hours. The CP meter reading on this filter sample was less than 6 mred/hr at the surface. The stack flow rate was 40,000 cfm (± 20%). The main 224-U (Uranium oxide plant) roof stack is now routed to the 291-U Stack and enters downstream of the ventilation air sand filter, which filters all air from the 221-U (TBP) facility.

200 EAST AREA - PUREX (A) PLANT

The two filter samples collected from the fifty foot level of the Purex stack are summarized in Table IV; Table V is a summary of the process conditions during the sampling periods.

TABLE IV

PUREX (A) PLANT FILTER SAMPLES
270 FOOT LEVEL OF STACK
DECEMBER, 1956

Number	DATE AND TIME On	Off	Sample CFM And Exposure Hours	REMARKS
(1)	0910 12-11-56	1330 12-11-56	5.0 4.33	HV-70 paper of 4" diameter exposed area used. Plugged with NH_4NO_3 at 1330 and changed.
3 (2)	1335 12-11-56	0245 12-12-56	6.1 13.17	HV-70 paper of 4" diameter exposed area used. Plugged with NH_4OH at 0245 and changed at 0930.
Sum of (1) and (2)	0910 12-11-56	0245 12-12-56	6.0 17.50	Stack flow averaged 118,300 cfm during runs (1) and (2), and I-131 emission was 3.5 curies from 0910, 12-11 to 0925, 12-12-56. <6 mrad/hr surface reading on C.P. meter for both filters.
4	0930 12-12-56	0910 12-13-56	6.4 23.67	Special paper of 4" diameter exposed areas used. No NH_4NO_3 plugging. Stack flow 117,900 cfm -<6 mrad/hr surface reading on C.P. meter. I-131 emission during this run was 5×10^{-2} curie.

TABLE V

PUREX (A) PLANT PROCESS CONDITIONS
12-11-56 to 12-14-56

Date	Time Between	Dissolver Operation*
12-11-56	1030-1630	Coating removal in B-cell
	1030-1630	First cut of "Heel" dissolution in A-cell
	1700-2330	Second cut of "Heel" dissolution in A-cell
	1700-2330	First cut in B-cell
12-12-56	0400	Second cut in B-cell started
	0000-0000	Third cut of "Heel" dissolution in A-cell
	0000-1900	Coating removal in C-cell
	1900	First cut in C-cell started

TABLE V (Continued)

PUREX (A) PLANT PROCESS CONDITIONS
12-11-56 to 12-14-56

Date	Time Between	Dissolver Operation*
12-12-56	1900	Coating removal in B-cell
12-13-56	0745	
12-13-56	0640	Second cut in C-cell
	0745	First cut in B-cell
12-14-56	0930	Second cut in B-cell

* See footnotes to Table III for explanation of "Cut" and "Coating removal".

** "Heel" is residual solid uranium in a dissolver after cuts are made and the metal solution transferred out of the dissolver vessel. Only rarely is this heel removed by dissolution, as its presence is necessary for efficient operation of the normal dissolving "cuts".

The first sample listed in Table IV (Log Number 3) is actually two filters (numbered 1 and 2 on the filter paper itself). Due to a heavy NH_4NO_3 emission during sampling, the first filter plugged and the flow rate dropped off to 0.0 cfm. This filter was changed almost immediately after the flow ceased and the second was installed. This second filter plugged with NH_4NO_3 also and the flow rate fell off rapidly to 0.0 cfm at 0245 on December 12, 1956. Although this filter was not removed until about 0930 on December 12, 1956, no gas was sampled after 0245. No plugging occurred when the special filter paper was used on December 12 to December 13, 1956, even though process conditions indicated NH_4NO_3 formation was occurring.

REACTOR AREA STACKS

The results of the four reactor area stacks sampled on December 12 to December 13, 1956, using the special filter paper, are given in Table VI.

TABLE VI

FILTER SAMPLES FROM REACTOR AREAS
DECEMBER, 1956

Log Number	Location Sampled	DATE AND TIME On	DATE AND TIME Off	Sample CFM And Exposure Hours	Stack Flow Rate
6	105-B Reactor Stack Breeching	0900 12-12-56	0955 12-13-56	0.5 24.92	130,000 cfm

TABLE VI (Continued)

FILTER SAMPLES FROM REACTOR AREAS
DECEMBER, 1956

Log Number	Location Sampled	DATE AND TIME On	DATE AND TIME Off	Sample CFM And Exposure Hours	Stack Flow Rate
7	105-C Reactor Stack Breeching	0920 12-12-56	1010 12-13-56	0.5 24.83	130,000 cfm
8	105-D Reactor Stack Breeching	0910 12-12-56	0905 12-13-56	0.5 23.9	130,000 cfm
9	105-KW Reactor Stack Breeching	1045 12-12-56	0935 12-13-56	0.5 22.83	130,000 cfm

Flow rate through all four reactor building stacks is 130,000 cfm (± 20%). All samples were operated at 0.5 cfm and gave readings of less than 6 mrad/hr at the surface on a C.P. meter. All but one of the reactors sampled were operating at normal power levels; 105-KW reactor was shut down.

Table VII through XIII are copies of the tables from Section I of our routine quarterly report for the fourth quarter of 1956. They do not include results for the days when filter samples were collected for your program.

TABLE VII

IODINE-131 DISCHARGED FROM THE A-PLANT STACK
OCTOBER, NOVEMBER, DECEMBER
1956

Units of Curies Per Day

Month	Maximum	Average
October	0.66	0.16
November	4.4	1.3
December	3.4	< 0.55
Quarter	4.4	< 0.68
Last Quarter	1.6	0.23

TABLE VIII

I-131 AND RADIOACTIVE RUTHENIUM
DISCHARGED FROM S-PLANT STACK
OCTOBER, NOVEMBER, DECEMBER
1956

Units of Curies Per Day

Month	Iodine-131		Radioactive Ruthenium	
	Maximum	Average	Maximum	Average
October	0.12	0.043	< 0.01	< 0.01
November	0.42	0.12	< 0.01	< 0.01
December	23	2.5	< 0.01	< 0.01
Quarter	23	0.89	< 0.01	< 0.01
Last Quarter	0.28	0.05	0.04	< 0.01

TABLE IX

RADIOACTIVE PARTICULATE MATERIALS DISCHARGED
FROM THE U-PLANT STACK
OCTOBER, NOVEMBER, DECEMBER
1956

Month	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	
	Maximum	Average	Maximum	Average	Maximum	Average
October	31	10	3.1	1.6	40	4.7
November	1.5	0.5	0.15	0.05	3.3	1.4
December	8.5	0.5	0.08	0.03	8	2
Quarter	31	3.7	3.1	0.57	40	2.5
Last Quarter	73	5.7	95	5.7	18	7.8

TABLE X

QUARTERLY SUMMARY OF
TRITIUM OXIDE, CARBON-14, SULFUR-35
DISCHARGED FROM REACTOR STACKS
OCTOBER, NOVEMBER, DECEMBER
1956

	Tritium Oxide		Carbon-14		Sulfur-35	
	Units of curie/day		Units of 10^{-3} curie/day		Units of 10^{-4} curie/day	
Stack	Maximum	Average	Maximum	Average	Maximum	Average
100-B	0.16	< 0.06	< 4.5	< 4.5	7.9	4.5
100-C	< 0.10	< 0.06	< 4.5	< 4.5	< 4.5	< 4.5
100-KW	0.32	< 0.15	10	6.1	7.9	7.9
100-KE	0.42	< 0.14	< 4.5	< 4.5	< 4.5	< 4.5
100-D	1.4	0.67	11	6.8	19	14
100-DR	0.32	0.20	< 4.5	< 4.5	5.5	< 4.5
100-H	0.09	< 0.08	< 4.5	< 4.5	6.1	< 4.5
100-F	0.21	< 0.14	< 4.5	< 4.5	57	35

TABLE XI

ALPHA PARTICLE EMITTERS DISCHARGED AS
PARTICULATES FROM REACTOR STACKS
OCTOBER, NOVEMBER, DECEMBER
1956

Units of 10^{-7} Curies Per Day

	October		November		December		Quarterly	
Stack	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average
100-B	0.61	0.26	0.68	0.16	0.78	0.17	0.78	0.20
100-C	0.47	0.20	0.30	0.08	9.2	2.6	9.2	0.97
100-KW	0.65	0.18	0.74	0.40	5.2	0.46	5.2	0.35
100-KE	1.2	0.40	0.73	0.36	0.45	0.16	1.2	0.31
100-D	0.58	0.17	0.47	0.19	3.1	0.46	3.1	0.27
100-DR	0.49	0.17	0.68	0.20	0.56	0.15	0.68	0.19
100-H	0.80	0.34	1.1	0.44	0.57	0.17	1.1	0.32
100-F	0.62	0.35	0.88	0.39	0.65	0.18	0.88	0.31

TABLE XII

BETA PARTICLE EMITTERS DISCHARGED AS PARTICULATES FROM REACTOR STACKS OCTOBER, NOVEMBER, DECEMBER 1956

Units of 10^{-5} Curies Per Day

Stack	October		November		December		Quarterly	
	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average
100-B	270	27	0.55	0.36	2.7	0.67	270	9.3
100-C	44	15	13	4.3	240	100	240	41
100-KW	6.7	2	3.4	1.4	4.4	1.3	6.7	1.6
100-KE	6.4	3.5	13	8	15	6.8	15	6.1
100-D	200	160	220	130	670	190	670	160
100-DR	7.8	1.7	26	3.2	3.7	0.65	26	1.8
100-H	17	8	11	7.2	4.9	3.6	17	6.3
100-F	120	66	170	110	190	110	190	95

TABLE XIII

RADIOACTIVE PARTICLES DISCHARGED FROM REACTOR STACKS OCTOBER, NOVEMBER, DECEMBER 1956

Units of 10^{5} Particles Per Day

Stack	October		November		December		Quarterly	
	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average
100-B	12	4.1	12	4.4	14	1.7	14	3.2
100-C	110	54	40	42	210	75	210	59
100-KW	18	4.3	5.1	3.6	43	6.3	43	4.9
100-KE	6.4	2.3	3.1	1.6	36	5.4	36	3.4
100-D	< 0.9	< 0.9	0.24	0.13	51	32	51	9.3
100-DR	74	25	5.6	2.5	3.6	0.7	74	5.6
100-H	6	2.1	38	8	11	2.2	38	4
100-F	48	8.6	6.9	4.9	62	22	62	11

If any further information is desired or more samples are needed, please contact either B. V. Andersen or J. K. Soldat at the following addresses:

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Very truly yours,

J. K. Soldat
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JKS:mls

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