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SEPARATIONS SECTION

RADIATION MONITORING MONTHLY REPORT

DECEMBER 1953

By A. R. Keene

General Electric Co.

Sanford Atomic Products Operation

By Authority of

SE. [redacted] 5/28/91
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SEPARATIONS SECTION
RADIATION MONITORING MONTHLY REPORT

DECEMBER 1953

SUMMARY:

Four Class I radiation incidents occurred. These included: two separate occasions in which batch size was exceeded in the 224-T E-4 tank (No. 92 and 93); the detection of several hundred micrograms of plutonium on the floor in the 224-T F operating gallery (No. 95); and the detection of widespread low-level particulate contamination in and around the 200-W Industrial Burial Ground (No. 94).

Repair work on the Redox canyon crane was completed and the building resumed operations early in the month. Subsequent cell maintenance work resulted in slight increases in contamination levels on the crane.

Dose rates from the self-concentrating condensers in the 241-S tank farm rose to levels which made temporary shielding difficult.

Increased efforts were directed to the resolution of splashing and splattering hazards during routine analytical work in the 222-S analytical laboratory.

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	<u>November</u>					<u>December</u>					<u>1953 to Date</u>
	<u>T</u>	<u>Z</u>	<u>S</u>	<u>U-B</u>	<u>Total</u>	<u>T</u>	<u>Z</u>	<u>S</u>	<u>U-B</u>	<u>Total</u>	
Special Work Permits	5	6	50	43	104	2	1	53	30	86	2172
Radiation Surveys	383	525	1037	953	2898	421	566	1153	819	2959	33965
Air Monitoring Samples	397	1034	729	488	2648	334	957	663	464	2418	34006
Skin Contamination Cases	3	12	39	8	62	3	12	20	5	40	610
Thyroid Checks	19	--	11	--	30	28	--	18	--	46	648

T FACILITY

Canyon Building Extensive call work continued with expected deck contamination. Sustained decontamination efforts resulted in return-to-normal condition by month's end.

Concentration Building Batch-size in the 224-T E-4 tank was exceeded on two separate occasions by a maximum of 40%. In both cases the amount, by which the batch size was exceeded, was far less than the amount required for criticality even under ideal conditions in the E-4 tank. The incidents were investigated (Class I, No. 92, HW-30245 and No. 93, HW-30371).

Contaminated shoes led to the discovery on December 30, of several hundred micrograms of plutonium on the floor of the F operating gallery. Six pair of personal shoes were contaminated from 2000 d/m to 500,000 d/m Pu. The source of the contamination could not be determined. A Class I investigation was scheduled, (No. 95, HW-30402).

Waste Areas Follow-up surveys from contamination spread difficulties while burying a box of used connectors from the 221-T canyon, led to the discovery of particulate contamination in and around the 200-W Industrial Burial Ground and on the railroad right-of-way between the burial ground and the Redox plant. The average intensity of this particulate material was 10,000 c/m and analyses indicated >95% ruthenium. Limited decontamination is in progress. The incident was investigated (Class I, No. 94, HW-30372).

Contamination in the cooling water retention basin returned to normal. More sensitive analyses of the cooling water stream indicated sporadic low level contamination in the cooling water, however, the increase in activity levels of the retention basin reported last month, can be attributed to the leaking E-5 coil in the 242-T waste evaporator. This coil was taken out of service.

Z FACILITY

Isolation Building Improvements were made in plastic sheet techniques used during call maintenance work. Contamination spreads and resulting personnel exposure during maintenance work were markedly reduced. Five skin contamination cases, with a maximum of 2000 d/m Pu, were successfully decontaminated.

Purification and Metal Fabrication Two contamination spreads occurred behind Task II causing surface contamination levels up to 1.9×10^{-10} μg Pu/cc. A leaking water

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line at hood 9 and a jacket failure on furnace #2 were the causes of the contamination. Remedial repairs were effected. Two cases of surface contamination also occurred in Task III resulting in equipment contamination in excess of 40,000 d/m Pu. Decontamination was promptly completed and bioassay samples for exposed individuals were scheduled.

Plutonium contamination up to 40,000 d/m was spread to 12 hood gloves when two process operators failed to detect overall sleeve contamination which was received during work in a ruptured glove in hood 14. Decontamination was completed and bioassay samples were obtained.

The hydraulic press was unconditionally released from the back of the RMA line.

S FACILITY

Canyon Building Repair of the canyon crane was completed and the building resumed operations early in the month. Subsequently maintenance work was done in F and H cells under careful control. Crane surveys revealed slight increases in contamination levels following this work, but prompt decontamination successfully removed most of the additional contamination. Control survey areas have been established on the crane to follow changes in contamination levels. Since the H-Cell sprays were not yet installed, H cell was not wet down prior to the crane work, and, as expected, airborne contamination in the canyon increased significantly during this period. Air samples indicated an increase in fission product concentration by a factor of 3000 during the H-cell work, but the concentrations subsequently returned to normal. Two entries were made to the canyon deck, and exposure rates were not significantly changed.

A substantial amount of maintenance work on crane equipment was done from the crane maintenance platform. The maximum exposure rate involved was 5 rep/hr one foot from the charging wrench.

Three boxes containing grossly contaminated equipment were removed and buried. Another D-12 pot was buried using the semi-remote unloading method employed previously. A dose rate of 15 mr/hr was measured 500 feet from this pot. A maximum exposure rate of 200 mr/hr was experienced during burial. In addition, a box containing two silver reacto and another box containing miscellaneous equipment were buried using the conventional unloading method.

Airborne contamination in the crane cab continued to be a problem and respiratory protection was required throughout the month. Fabrication of the airlock entrance to the cab and design of a new air supply system for the cab are proceeding.

The railroad tunnel, which had been repeatedly grossly contaminated was decontaminated to a maximum of 300 mrep/hr, excluding the floor drain, where a dose rate of 1 rep/hr including 100 mr/hr at 6 inches was measured. A continuously contaminated railroad tunnel creates an undesirable likelihood of contaminating the rolling stock and right-of-way.

Cleaning was essentially completed in the south pipe and operating galleries and the north operating gallery, where liquid from the canyon and crane decontamination had seeped through construction joints.

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Exposure rates were low for the installation of sample box hood ductwork in the east end of the south sample gallery. Exposure rates will increase as work progresses towards the contaminated west end of the south sample gallery.

Stack Area The iodine emission rate averaged 0.7 with a maximum of 2.3 curies per day.

The ruthenium emission rate averaged 0.9 with a maximum of 1.8 curies per day. The ruthenium average is slightly higher than previously and is probably due to the plug which developed in the H-5 caustic recirculation line. Although some caustic was being recirculated, it was necessary to add caustic periodically to the top of the H-5 tower. The constant stack monitor was used as a guide for this addition. Excessive reaction rates in the dissolvers resulted in several brief periods of higher than normal iodine emission as evidenced by the stack monitor. The duplicate recorder from the stack monitor, which has been installed in the dispatcher's office, proved very valuable in locating the above difficulties and probably prevented the liberation of higher quantities of iodine and ruthenium from the stack.

The B-3 silver reactor was replaced because of faulty heaters. The C-3 reactor was regenerated according to the planned frequency for regeneration of silver reactors based on tonnage of metal dissolved.

Control survey areas around the stack continued to indicate the deposition of 1 to 2 particles per square foot per month.

A dose rate of 15 r/hr was measured two inches from the J-1 line in the jet pit house.

Waste Areas Self-concentration of liquid wastes in the 241-S storage tanks continued.

The dose rates on the condensers increased to the point where installation of shielding was made difficult by the short time limits. The dose rate on the 101 tank condenser increased from 120 mr/hr at two inches to 5 r/hr at 2 feet. The increase was gradual until the middle of the month when the dose rate suddenly increased sharply. The sudden increase was attributed to blowing steam through the waste line following a transfer. The dose rate approximately thirty feet from the 104 tank condenser increased from 250 mr/hr to 470 mr/hr late in the month. The dose rate at the east fence of the 241-S tank farm was 15 mr/hr following these increases and it was necessary to barricade a considerable area east of the tank farm. Installation of shielding blocks was started around the 104 condenser. During this work, however, an abandoned sampling tube from the 104 condensate line was discovered to be siphoning condensate onto the ground east of the condenser. A dose rate of 50 rep/hr was measured two feet from this pool of liquid. Efforts for the rest of the month were directed towards confining the ground contamination, decontaminating a crane which had backed onto the contaminated area while unloading blocks, and picking up contamination which was spread by the crane. Exposure rates up to 3 r/hr were experienced during this work.

A leak was repaired in the 240-S-151 diversion box. Exposure rates up to 3 r/hr were experienced by the riggers and up to 400 mr/hr by the crane operator. A dose rate of 10 mr/hr was measured 175 feet from the box as a result of "sky-shine".

Copper sulphate was again added to the swamp. Inspection showed an excellent "kill" of vegetation, and very few water fowl were observed on the swamp. Surveys around the swamp indicated no contamination spread.

Surface dose rates up to 200 mrep/hr were detected at the edge of the 222-8 swamp, and a narrow strip approximately 300 feet long was roped off. The activity limits for disposal to the swamp are being reviewed, and plans for covering the contamination were being reviewed at month's end.

U FACILITY

UO₃ Plant Contamination and exposure control was generally good. Some difficulty was experienced with the X-12 fiberglass filters mechanically failing due to the increased exhaust capacity installed last month. Excessive discharge to the atmosphere, however, was not experienced.

TBP Plant An abnormal maintenance load was experienced in the canyon this month, in preparation for changing the existing parallel process operation over to series operation. Both RA columns were replaced by month's end with little difficulty. Inspections, jumper regasketting, and other associated maintenance work were accomplished with exposure rates up to 1.6 rep/hr surface. Fission product in air concentrations up to 1.4×10^{-9} $\mu\text{c/cc}$ were measured in cells where personnel entry was required.

On two occasions personnel were exposed without respiratory protection to air above the long-term permissible limit. Both situations were caused by condensers unexpectedly venting to process cells. The maximum air contamination was 4.1×10^{-8} $\mu\text{c f.p./cc}$. Bioassay samples indicated insignificant deposition.

Waste Areas Approximately 260,000 gallons of scavenged RAW solution with an average beta activity of 0.5 $\mu\text{c/cc}$ was transferred to an experimental crib from the 101-T tank without incident. Pumping rates were seriously restricted because of slow soil percolation rates and a small crib floor area. Dose rates up to 8 mr/hr were measured on the transfer line, with dose rates up to 300 mrep/hr at the crib lip when the liquid level raised to within one foot of crib top. The crib is scheduled to be backfilled shortly.

Approximately 410,000 gallons of first cycle waste supernatant have been discharged to the open trenches in 200-East Area. Contamination control has been exceptional. Airborne contamination up to 2.9×10^{-9} $\mu\text{c f.p./cc}$ was detected downwind of the first trench, which was backfilled at completion of the scheduled transfer. Pumping which was discontinued because of pump failures, will probably be resumed in January.

B FACILITY

General pump repair in the B canyon is scheduled to end upon completion of repair of a Johnston pump currently undergoing repair. Canyon deck and equipment cleanup will follow, at which time the 221-B building will be shutdown completely.

ANALYTICAL LABORATORIES In the 234-5 laboratory, a small cork stopper, which was probably from a peanut carrier, was found on the floor and was grossly contaminated with microgram amounts of plutonium. Contamination was subsequently, unknowingly tracked into several laboratory rooms and corridors. Air samples did not indicate significant amounts of airborne contamination.

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In the Redox laboratory, increased efforts were directed towards better control of splashing and splattering hazards, which have resulted in localized exposures to the skin above permissible limits. Steps which have been taken by Analytical and Radiation Monitoring supervision and preliminary results include the following:

1. Hourly personal surveys are required by laboratory supervision of all persons working in the decontamination room. Initial results were as follows:

Number of surveys:	1126
Contaminated clothing cases:	88
Maximum levels:	20,000 c/m, 20,000 d/m

70% of the clothing contamination cases involved gloves. No definite conclusions as to locating the source have been reached, although over half of the cases involved some type of work with doorstops. An interesting trend discovered was that certain individuals seemed prone to have contaminated clothing more frequently than others. Although this may not be a valid conclusion and may only reflect better survey technique, laboratory supervision has taken steps to give these individuals more training.

2. Routine surveys of plastic-aprons has shown the following results:

Number of surveys:	71
Contamination Cases:	12
Maximum Levels:	20,000 c/m, 10,000 d/m

No conclusions as to the source of contamination were reached.

3. Absorbent papers were placed in the various hoods in several laboratory rooms to be surveyed periodically by Radiation Monitoring. Results are as follows:

Number of papers surveyed:	276
Number of papers contaminated:	2
Maximum level:	50,000 c/m

Two of the six absorbents from hood 5 (sample disposal hood) were contaminated. No contamination was detected on absorbents removed from other hoods.

4. Limits on doorstops, which must be decontaminated, were reviewed. In the future doorstops will not be cleaned inside unless the dose rate over the open well is greater than 100 mrep/hr or that at the side of the doorstop exceeds 6 mrep/hr. This should reduce the amount of doorstop handling necessary. Also, initial decontamination efforts on the inside of doorstops will involve the use of a damp rag rather than an acid-soaked rag.
5. Plant Engineering has been requested to study the whole operation in the decontamination room.

D. R. Keene
A. R. Keene, Superintendent
Radiation Monitoring

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LOCATION	TOTAL NUMBER SAMPLES	AVERAGE CONCENTRATION DETECTED WITH NO RESPIRATORY PROTECTION WORN			MAXIMUM CONCENTRATION DETECTED WITH NO RESPIRA- TORY PROTECTION WORN			MAXIMUM CONCENTRATION DETECTED			REMARKS
		UNITS OF 10-12 µg Pb/cc	UNITS OF 10-7 µc f9/L	UNITS OF 10-6 µg U/cc	UNITS OF 10-12 µg Pb/cc	UNITS OF 10-7 µc f9/L	UNITS OF 10-6 µg U/cc	UNITS OF 10-12 µg Pb/cc	UNIT OF 10-7 µc f9/L	UNITS OF 10-6 µg U/cc	
U FACILITY 503 Plant Powder Areas Exhaust to Atmos.	152	--	--	--	--	--	--	--	--	680 r	(1) Condenser vent jumper not installed.
	69	--	--	1.7	--	--	12	--	--	51 r	
	135	2.0	<1	<1	(1)390	<1	2.1	<1	390	2.1	
	22	<1	<1	<1	<1	<1	<1	<1	<1	<1	
TEP PLANT Canyon Building Galleries Tank Farms Others	45	<1	<1	--	<1	<1	--	29	--	--	
	13	1.0	<1	<1	130	130	1.6	130	130	1.6	

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4 - ABSOLUTE SCALE
C - APPROX VALUE

AIR SAMPLE SUMMARY

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