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OPERATIONS DIVISION MONTHLY REPORT

FOR

MONTH ENDING OCTOBER 31, 1954

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OPERATIONS DIVISION MONTHLY REPORT

for

Month Ending October 31, 1954

by

A. F. Rupp

DATE ISSUED

DEC 22 1954

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OPERATIONS DIVISION MONTHLY REPORT

REACTOR OPERATIONS

ORNL Graphite Reactor

Two ruptured slugs were found on October 23 and 25; data are given in Table 1. There is a possibility that a fairly rapid startup, on October 13, for an experiment caused the uranium slug to expand more rapidly than the jacket, making the jacket crack.

The pumps and filters in the canal water demineralizer installation, in addition to the head tank on top of the reactor, are being operated. The sand filters are being decontaminated by repeated leachings with nitric acid to remove radioactivity. The installation will be complete when the sand has been removed and has been replaced with anion resin.

The automatic power controller installed in September has operated satisfactorily except for a few minor troubles.

A request has been received to install a neutron spectrometer in hole 22, which is now occupied by pneumatic tubes. It will be possible to shift the pneumatic tubes to hole 21 and thus make room for the neutron spectrometer. The sulfur now being irradiated for P^{32} production in hole 21 can be shifted to hole 15.

The 900-hp motor damaged by lightning on August 28 has been repaired at K-25 at a cost of 143.7 man-hours of labor. The stator was tested at 4000 v to ground, the rotor rebalanced, and the balance weights rewelded. This motor will now serve as an emergency spare until a new, spare motor is purchased. The new, spare motor was ordered during October and is to be delivered in January 1955.

Recommendations have been obtained from several manufacturers for lightning protection in the fan house. All recommendations received thus far are in agreement that condensers and arresters should be installed near the motors.

Operating data for the ORNL Graphite Reactor and the LITR are given in Table 2. Pressure-drop data on the exit air filters are given in Table 3. The usage of experimental facilities in the ORNL Graphite Reactor is given in Table 4.

Low-Intensity Test Reactor

A comparison of the September and October shutdowns is given below.

	October (hr)	September (hr)
Unscheduled shutdowns for operational reasons	1.133	2.567
Regular operations shutdowns	27.200	25.017'
Special shutdowns for research	247.849	74.184

The new demineralizer ion-exchange resin bed installed in September was nearly depleted by the end of October, thus giving about six weeks of continuous service. It is interesting to note that this demineralizer has been operated at about ten times the flow rate of the old unit; it holds approximately ten times the resin, but lasted for six weeks instead of two weeks, as was normal with the old unit. In addition to greater capacity, the new demineralizer has maintained the specific resistance of the water at about 500,000 ohms compared with about 250,000 ohms with the old unit. The new unit has also decreased the radioactivity in the water from about 300,000 to about 60,000 counts/min/ml. The anion resin was ap-

TABLE 1. DATA ON SLUGS RUPTURED IN THE ORNL GRAPHITE REACTOR

Rupture No.	Channel	Days in Reactor	Approximate Temperature (°C)	Position from West End of Row	Remarks
128	2069	935	235	17	From batch 113, 0% beta transformed; completely oxidized
129	1674	931	215	31	From batch 115, 27.3% beta transformed

[redacted]

TABLE 2. REACTOR DATA

	ORNL Graphite Reactor			LITR		
	October 1954	September 1954	Year to Date	October 1954	September 1954	Year to Date
Total energy, Mwd	99.8	98.0	1002.8	52.8	64.0	725.5
Average power/operating hr, kw	3500	3500	3562	2708	2486	2906
Average power/24-hr day, kw	3219	3266	3299	1703	2134	2386
Lost time, %	8.0	6.7	7.4	37.1	14.1	17.9
Excess reactivity	99 inhr	112 inhr		2.57%	2.6%	
Fuel pieces charged	44	120	866	2	1	16
Fuel pieces discharged	136	96	1156	2	1	16
Research samples	109	96	920	9	9	98
Radioisotope samples	221	183	2158	25	23	223

TABLE 3. PRESSURE-DROP DATA

	Pressure Drop (in. water gage)		
	Glass Wool	CWS No. 6	Total Across House
10-31-54	1.4	1.3	4.1
9-30-54	1.4	1.3	4.1
Clean filters	1.1	1.3	3.3

parently depleted first, since the effluent from the column became more acidic. The amounts of various anions taken up on the resin will be determined.

The HRP loop was operated successfully for approximately three weeks in HB-4 and was removed on October 27. In order to increase the thermal-neutron flux in the west side of the reactor, fuel elements were moved from lattice positions 11, 21, and 31 to positions 45, 55, and 56, directly in front of HB-5. A measurement of the thermal flux has not yet been made, but this will be done as soon as possible. The movement of the fuel elements necessitated moving the neutron chambers on both the north and west side. Those on the north side had to be moved closer to the reactor and those on the west side had to be moved away to compensate for the changes in neutron flux.

It was found on October 11 that the No. 1 magnet was somewhat damaged. The insulation on the lead wires was in particularly bad condition, and the magnet has been disassembled so that new coils can be installed on the core pieces. Several new magnets will be ordered so that there will be enough replacements on hand.

The east fan motor on the fluid cooler was repaired and reinstalled on October 1; the north pump motor was repaired and reinstalled shortly afterwards.

The usage of experimental facilities in the LITR is shown in Table 5.

RADIOISOTOPE PRODUCTION AND SALES

Data on the production of processed and unprocessed radioisotopes are given in Tables 6 and 7; special-preparations data are given in Table 8; and a summary of radioisotope shipments is given in Table 9.

Production of radioiodine continued routinely in the new unit. Yields have improved so that only 75% of the irradiated uranium formerly required is being used to meet radioiodine requirements.

The price of bakelite-P^{32} beta irradiation disks has been increased from $40 to $55 per month, in order to be consistent with the new price schedule for service irradiations. The pricing schedule for Co^{60} has been extended to include Co^{60} with specific activity of 60–70 curies/g at a price of $14 per curie.

Cobalt received from the MTR was monitored, with the following results: 1052 pieces $\frac{1}{16} \times \frac{1}{16}$ in., 0.47 curies per piece; 280 pieces $\frac{1}{8} \times \frac{1}{8}$ in., 2.5

TABLE 4. USAGE OF EXPERIMENTAL FACILITIES – ORNL GRAPHITE REACTOR

Hole Number and Orientation	Dimensions (in.)	Division in Charge of Facility	Person in Charge	Type of Experiment or Usage
1, 2, north and south	4 × 4			Regulating rods
3, north and south	4 × 4	Operations	J. A. Cox	Sulfur exposure for radiophosphorus production
4, north and south	4 × 4	Operations	J. A. Cox	Miscellaneous exposures of special samples
5, 6, north and south	4 × 4			Shim rods
7, 8, 9, vertical	4 × 4			Safety rods
10, vertical	4 × 4	Solid State	J. H. Crawford, Jr.	Low-temperature sample-exposure facility (no samples during month)
11, vertical	4 × 4	Operations and Chemical Technology	J. P. McBride	Boron shot safety tube and HRP fuel studies
12, vertical	4 × 4	Operations	J. A. Cox	General exposures of samples in water-cooled facility
13, 14, north and south	4 × 4	Operations	J. A. Cox	Target exposures for radioisotopes and research
15, south	4 × 4	Operations	J. A. Cox	Miscellaneous large-sample exposures
15, north	4 × 4	Solid State (G.E.)	L. E. Stanford (G.E.)	Miscellaneous large-sample exposures*
16, north and south	4 × 4	Operations	J. A. Cox	Sulfur exposure for radiophosphorus production
17, north	4 × 4	Unassigned		Empty
17, south	4 × 4	Physics	E. O. Wollan	Neutron polarization*
18, north and south	4 × 4	Operations	J. A. Cox	Miscellaneous large-sample exposures
19, north and south	4 × 4	Solid State	O. Sisman	Water-cooled exposure facility
20, north	4 × 4			Graphite temperature thermocouples
20, south	4 × 4	Solid State	J. C. Wilson	Creep of metals (no samples during month)
21, north and south	4 × 4	Operations	J. A. Cox	Sulfur exposure for radiophosphorus production
22, north	4 × 4	Solid State (G.E.)		Ionization-chamber tests*
22, south	4 × 4	Operations	J. A. Cox	Two pneumatic tubes for general usage
30	9 × 9	Solid State (G.E.)	L. E. Stanford (G.E.)	Life tests of equipment in radiation (no tests during month)
31	9 × 9			Blocked by one end of air seal H-beam across top of graphite
32, 33	9 × 9			Contain chamber for high-power-level trip circuit

*None during month.

TABLE 4. (continued)

Hole Number and Orientation	Dimensions (in.)	Division in Charge of Facility	Person in Charge	Type of Experiment or Usage
34	9 × 9			Contains chamber for No. 2 power-level galvanometer
35	9 × 9			Blocked by one end of air seal H-beam across top of graphite
36	9 × 9			Contains chamber for high-power-level trip circuit
37	9 × 9			Test facility for ionization chambers
40	9 × 9			Contains chamber for No. 1 power-level galvanometer
41	6-in. dia			Rear wall suction-pressure tap; hole into discharge manifold
42	6-in. dia			Unit pressure differential tap; hole into discharge manifold
43	6-in. dia			Unused (inaccessible); hole into discharge manifold
44	6-in. dia			Unused; hole into discharge manifold
45	6-in. dia			Gas discharge from hole 22 pneumatic tubes; hole into discharge manifold
46, 47	6-in. dia			Used for viewing west end of graphite with periscope; vertical holes into discharge manifold
50, north	4 × 4	Solid State	J. H. Crawford, Jr.	General sample-exposure facility
50, south	4 × 4	Physics	E. O. Wollan	Neutron spectrometer
51, north	4 × 4	Solid State	J. H. Crawford, Jr.	Water-cooled U^{235} neutron converter
51, south	4 × 4	Physics	C. G. Shull	Neutron spectrometer
52, north	4 × 4	Solid State	J. H. Crawford, Jr.	Facility for exposing samples at liquid-nitrogen temperatures
52, south	4 × 4	Physics	L. D. Roberts	Low-temperature work
53, 54, 55	4 × 4	Solid State (G.E.)	L. E. Stanford (G.E.)	Half-holes for miscellaneous large-sample exposures*
56, north	4 × 4	Physics	E. C. Campbell	Fast pneumatic tube
56, south	4 × 4	Physics	H. S. Pomerance	Oscillator for measuring neutron absorption cross sections
57, north	4 × 4	Training School	H. S. Pomerance	General-purpose neutron collimator
57, south	4 × 4	Physics	S. Bernstein	Neutron polarization*
58, north	4 × 4	Unassigned		Empty
58, south	4 × 4	Chemistry	H. Levy	Neutron spectrometer

*None during month.

TABLE 4. (continued)

Hole Number and Orientation	Dimensions (in.)	Division in Charge of Facility	Person in Charge	Type of Experiment or Usage
59	4 × 4	Unassigned		Half-hole; blocked by work at hole 17, south
60	4 × 4	Solid State	J. C. Wilson	Half-hole for creep of metals (no samples during month)
61	4 × 4	Operations	J. A. Cox	Half-hole for miscellaneous large-sample exposures
East and west animal tunnels				General exposures of large samples to low flux
Thermal column		Physics		Used by several groups for low-level neutron flux work
Inclined animal tunnel in thermal column				Exposures of biological specimens
West core hole		Physics		Lid tank for shielding studies
A	1.68-in. dia	Operations	E. E. Beauchamp	Charging-face hole containing 20 small cans of $CaCO_3$
B	1.68-in. dia	Unassigned		Charging-face hole; empty
C	1.68-in. dia	Solid State	J. C. Pigg	Charging-face hole; insulation test
D	1.68-in. dia	Solid State	C. E. Schilling	Charging-face hole; uranium samples
1069	1.5-in. dia	Unassigned		Charging hole containing an aluminum liner used for general exposure of suitable samples
1768, 1968	1.75 in. square	Solid State	R. H. Kernohan	Charging holes containing neutron converter donut; used for general exposures of samples to fast-neutron flux
1867	1.75 in. square	Unassigned		Charging hole containing neutron converter donut; used for general exposures of samples to fast-neutron flux
2079	1.5-in. dia	Operations	J. A. Cox	Charging hole containing pneumatic tube; used for exposure of research and radioisotope samples
0857, 0880, 1484, 1853, 2857, 2880				Charging-face holes containing boron-coated thermopiles for reactor instrumentation
Others				Seven uncharged peripheral holes contain $CaCO_3$ for radioisotope production; 409 uncharged peripheral holes remain unused

TABLE 5. USAGE OF EXPERIMENTAL FACILITIES – LITR

Facility Number	Type of Facility	Division in Charge of Facility	Person in Charge	Type of Experiment or Usage
HB-1	6-in.-ID beam hole	Physics	E. C. Smith	Chopper-type neutron velocity selector
HB-2	6-in.-ID beam hole	Solid State (G.E.)	D. S. Billington	General exposures of large samples and loops (no tests during month)
HB-3	6-in.-ID beam hole	Solid State	J. C. Wilson	Creep of metals
HB-4	6-in.-ID beam hole	Chemistry	G. H. Jenks	HRP loop test
HB-5	6-in.-ID beam hole	Chemistry	G. H. Jenks	HRP fuel stability and corrosion tests (no tests during month)
HB-6	6-in.-ID beam hole	Chemistry	G. H. Jenks	HRP fuel stability and corrosion tests
HR-1, 2	Pneumatic tubes	Operations	J. A. Cox	General short exposures of research and radioisotope samples
C-28	Hollow fuel element in core	Solid State	T. H. Blewitt	Exposure of metal crystals to high, fast flux
C-38	Hollow fuel element in core	Solid State	J. B. Trice	Exposure of specimens for flux determination methods
C-42	Hollow Be core piece with access tube from top plug	Solid State (G.E.)	L. E. Stanford (G.E.)	Exposure of miscellaneous small specimens
C-44	Hollow Be core piece with access tube from top plug	Chemistry	G. H. Jenks	Out of service
C-46, 48	Hallow Be core pieces with access tube from top plug	Solid State	G. W. Keilholtz	ANP fuel tests (no tests during month)
C-49	Be core piece with four vertical holes	Operations	J. A. Cox	Exposures of research and radioisotope samples
C-53, 56	Mg trays in core space	Operations	J. A. Cox	Exposures of research and radioisotope samples
V-1	Inclined low-flux hole			Contains boron-coated thermopile for reactor instrumentation
V-2	Inclined low-flux hole	Analytical Chemistry	G. W. Leddicotte	Exposure facility for activation analyses
V-3, 4	Inclined low-flux holes	Unassigned		Empty

TABLE 6. PROCESSED RADIOISOTOPE PRODUCTION DURING OCTOBER

Product	Source	Amount (mc)	Specific Activity (mc/g)
Arsenic-73	ORNL 86-in. cyclotron	2.7	No carrier added
Arsenic-74	ORNL 86-in. cyclotron	2.4	No carrier added
Calcium-45	Graphite Reactor irradiation	1,408	4.5
Chromium-51	LITR irradiation	2,744	3,118
Iodine-131	Graphite Reactor metal	57,236	No carrier added
Iodine-131	W metal	60,135	No carrier added
Iron-59	LITR irradiation	41	5,580
Phosphorus-32	Graphite Reactor irradiation	23,684	40,000
Sodium-24	LITR irradiation	931	2,439
Strontium-85	ORNL 86-in. cyclotron	15.8	No carrier added
Sulfur-35	W irradiation	73,000	No carrier added
Tin-113	Arco irradiation	59	15.88

TABLE 7. UNPROCESSED RADIOISOTOPE PRODUCTION DURING OCTOBER

Product	Units
Service irradiations	81
Antimony-beryllium	1
Antimony-122	1
Antimony-125	1
Arsenic-76	1
Bromine-82	1
Calcium-45	1
Chlorine-36	3
Copper-64	3
Gold-198	59
Iodine-131	4
Iridium-192	6
Molybdenum-99	2
Nickel-63	1
Phosphorus-32	4
Potassium-42	23
Rhenium-186	1
Rubidium-86	7
Silver-111	4
Sodium-24	18
Thallium-204	1
Tungsten-187	1
Zirconium-95	1
Total	225

TABLE 8. SPECIAL RADIOISOTOPE PREPARATIONS DURING OCTOBER

	Number	Amount
Co^{60} sources	25	5706 curies
Ir^{192} sources	12	187 curies
Ce^{144} sources	2	300 mc
H^3-Zr targets	7	8444 mc
H^2-Zr targets	6	*
H^3 ampoules	15	4380 mc
He^3 ampoules (>95%)	2	1250 cc
He^3 ampoule (3.5–4.0%)	1	100 cc

*These were thin Zr targets and therefore contain such a small amount of deuterium as to be immeasurable.

curies per piece; 35 pieces 1 × 1 cm, 29 curies per piece.

Repair work has been completed on tanks Nos. 19 and 20, which contain Metal Recovery Plant waste. It was necessary to replace the underground, black iron flanges, which had corroded, with stainless steel and to seal all exposed joints with Bitumastic compound. The fission-product semiworks will be ready to resume operations December 1 for processing wastes to obtain several thousand curies of Cs^{137}, 100 to 200 curies of

TABLE 9. RADIOISOTOPE SHIPMENTS

	October 1954	September 1954	October 1953	August 1946 Through October 1954
Separated material	789	751	857	49,254
Unseparated material	209	199	203	12,990
Total	998	950	1060	62,244
Nonproject	895	863	931	
Project	74	66	105	
Foreign	29	21	24	
Total	998	950	1060	

Sr^{90}, 500 curies of Ce^{144}, and gram amounts of Tc^{99}.

Construction of the new Multi-Kilocurie Loading Cell was started by the contractor on October 25.

An order was placed for 500 1-cc-volume ampoules for shipping tritium, Kr^{85}, and other gases at a price of 45¢ each, a saving of $1.50 each on ampoules made at the Laboratory.

RADIOISOTOPE DEVELOPMENT

Production of $Eu^{152,154}$

The long-term experiment for activation of Eu_2O_3 has progressed far enough to indicate that the saturation value will be reached in about two years at a neutron flux of 1.3×10^{13} neutrons/cm^2/sec. This is twice as long as was predicted from calculations based on the use of neutron capture cross sections and half lives reported in the literature. It now appears that $Eu^{152,154}$ may be useful for some purposes because of its relatively long half life (13–16 years), even though Co^{60} can be produced more efficiently with the use of neutrons.

Fission-Product Pilot Plant

The AEC directive for construction of the FPPP has not yet been received, but preliminary design work has been started. A large saving ($50,000) has already been obtained by including the order for 16 manipulators in another large Laboratory order for similar equipment.

Quantitative chemical flow sheets, based on Purex-type feeds, were completed. Chemical flow sheets for the other types of feed material are being prepared.

Experimental determinations of precipitate volumes, centrifuging characteristics, and other data necessary for final equipment design are in progress.

Cadmium-109

A method was developed for isolating Cd^{109} from silver targets irradiated with protons on the 86-in. cyclotron. Since Cd^{109} has a half life of 470 days and a gamma radiation of approximately 85 kev, it is of interest as an x-ray type of source. The separation was accomplished by precipitating the silver as AgCl and taking up the Cd^{109} from the 3 *N* HCl filtrate on Dowex 2 anion-exchange resin. The Cd^{109} was then eluted from the column by adding water.

Aluminum-26

An unidentified activity whose chemistry resembles that of aluminum was isolated from magnesium targets which had been irradiated with deuterons for the production of Na^{22}. Radiations from this radioisotope were measured, with the following results: beta, 2.1 and 0.12 Mev; gamma, 1.6, 0.6, and 0.48 Mev.

This concentrate was sent to Carnegie Institute of Technology to research people who are interested in studying Al^{26}. The quantity of Al^{26} found in the target was probably less than 1 μc.

Ion Chamber Calibration for Kr^{85} and A^{37}

A Borkowski-type ion chamber was calibrated with the use of samples in which the Kr^{85} had been assayed by mass spectrographic analysis. The A^{37} calibration was made by using data and calculations reported in the literature and cross-

checked against experimental values obtained by dilution methods and Geiger-Mueller gas counting. A report is being prepared on this work.

Separation of Promethium and Americium

In the study of the ion-exchange separation of promethium and americium, two elutriants, lactic acid and tartaric acid at pH 4.0, were used. Both reagents accomplished separations at a temperature of 95°C and a flow rate of 2 column volumes per hour. Equilibrium studies were also made with pentanedione and glycolic acid. However, production rates with these reagents are much too slow for practical purposes.

Precipitation methods that are being studied look more promising. Americium is oxidized to the 6+ valence state with sodium persulfate in 0.3 *M* perchloric acid, followed by precipitation of promethium as PmF_3. Recoveries of approximately 80% promethium, free of americium, have been obtained by this method. Sodium bromate may also be used as an oxidant, but it is not so efficient as sodium persulfate.

Inorganic (3-M) Ion Exchanger

Tests have been completed on the previously reported (in July) 3-M ion exchanger for removal of cesium from solutions containing NH_4^+, Al^{+++}, and SO_4^{--} and for the separation of cesium, potassium, and rubidium with HCl. It was found that capacities and separation factors are poorer than with the usual organic resin exchangers and that plugging of the columns occurs as a result of the decrepitation of the exchanger particles, which are apparently unable to satisfactorily withstand osmotic forces.

RADIOISOTOPE-WASTE DISPOSAL

A total of 19.6 curies of beta activity was discharged to White Oak Creek from the settling basin and the retention pond (see Table 10). This discharge is 15% greater than that of last month, and 55% of the average per month during 1953. The increase was the result of a purging of the Graphite Reactor Building canal, the decontamination of the manipulator cell in Building 3026, and the discharge of water from the Metal Recovery Building canal.

A total of 167,550 gal of wastes, containing 277.0 curies, was transferred to chemical storage pit No. 2 this month. Of the total, 3750 gal was not active and was trucked from Unit Operations Building 4505. The total of all wastes discharged to waste storage pit No. 2 to date is 1,095,708 gal containing 13,661 curies. (The curie figure has been erroneously reported 4038 curies too high since July 1954, as the result of a calculating error.)

A total of 181,400 gal of waste was put through the chemical-waste system.

An additional line to the pump from the tank farm to chemical-waste storage pit No. 2 was installed from waste tank W-6, but it is not yet working satisfactorily.

A new line has been installed to tank W-6, which connects to the hot chemical-waste line from Building 3019. This new line, with its valve arrangement, enables routing of future hot waste from Building 3019 to tank W-6 for long-time storage and radioactive decay. Building 3019 will have exclusive use of tank W-6, while the other buildings will continue to send radioactive wastes to tank W-5.

The sampling flowmeter servicing manhole No. 25 in the north tank farm process waste system has been revised for simpler operation.

The rebuilt air Velometer probes have been received from the vendor and reinstalled in all the

TABLE 10. ACTIVITY DISCHARGED TO WHITE OAK CREEK

Source	October 1954		Average per Month, Year to Date		Average per Month, 1953	
	Gallons	Beta Curies	Gallons	Beta Curies	Gallons	Beta Curies
Settling basin	10,650,000	19.0	13,570,000	16.9	19,450,000	24.1
Retention pond	450,000	0.6	500,000	1.6	500,000	11.7
Total	11,100,000	19.6	14,070,000	18.5	19,950,000	35.8

tributaries of the hot off-gas system at the radioactive gas stack area.

The semiannual inspection of the Cottrell precipitator was made this month. All insulators and rectifying tubes were cleaned, relays were checked, and an automatic ventilating damper was repaired. The equipment was found to be in good condition. The Cottrell precipitator was shut down for 16 hr for this and other work this month.

A thermostatically controlled heating element was installed in the oil-mist lubricator reservoir to maintain optimum operating temperature of the oil during cold weather. This system services the hot off-gas fan bearings.

MISCELLANEOUS OPERATIONS

Demineralized Water

Demineralized water production was 399,300 gal this month, compared with 504,680 gal in September.

An offer has finally been received from the manufacturer to replace the resin that was found to be defective and that had to be removed from one of the columns last summer.

Operating data on the demineralizers are given in Table 11.

Hydrogen Liquefaction

The new hydrogen liquefier has been completed and almost completely installed. Test runs will be made in November. No liquid hydrogen was made during the month.

Activation Analyses

A total of 183 requests for information concerning activation analyses has been received; 81 have developed into requests for analyses, 64 of which have been completed.

Off-Shift Services

The Chemical Separations Department expended 350 man-hours in performing various "patrol" work requested by other divisions. The jobs included filling cold traps, tending electric furnaces, maintaining bottled oxygen supply, and generally ensuring continued operations of equipment and experiments on evening shifts and weekends.

Decontamination Services

About 242 man-hours was spent on general decontamination work for the Laboratory this month. A new steam-heated dissolver was installed north of the decontamination building for the purpose of dissolving scrap uranium for the SF office. This equipment will go into operation next month.

TABLE 11. AVERAGE AMOUNTS OF WATER PASSED THROUGH REGENERATION UNITS DURING SEPTEMBER AND OCTOBER

	Number of Regenerations		Amount of Water Through Each Unit (gal)	
	October	September	October	September
No. 1 cation	2	7	60,750	15,071
No. 2 cation	3	4	52,767	61,325
No. 1 anion	2	8	52,350	20,775
No. 2 anion	4	10	54,350	29,845