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OPERATIONS DIVISION MONTHLY REPORT

FOR

MONTH ENDING SEPTEMBER 30, 1954

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OPERATIONS DIVISION MONTHLY REPORT

for

Month Ending September 30, 1954

by

A. F. Rupp

DATE ISSUED

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OPERATIONS DIVISION MONTHLY REPORT

REACTOR OPERATIONS

ORNL Graphite Reactor

No ruptured slugs were found during September. Additional measurements of the over-all length of slug rows in the reactor were taken on groups of slugs which were either 100% beta transformed, nontransformed, or partially transformed. Operating data for the ORNL Graphite Reactor and the LITR are given in Table 1.

Several orders for sliced, irradiated slugs were filled during the month. Considerable trouble was encountered with contamination of the canal floor because of leakage around the filter in the exit line which is used to catch the fine particles from the cutting wheel. A new shield is being made which will prevent spread of contamination from this source.

The canal-demineralizer installation is complete except for the caustic storage tank and the replacement of the sand in the filter tank with anion resin.

The canal level is now being controlled by means of a float switch which actuates a solenoid valve. This holds the canal level very constant, and the amount of canal water overflowing to the settling basin has been reduced. The float valve formerly used did not control the canal level well enough to prevent excessive overflow.

An automatic reactor-power controller was installed to actuate the No. 5 shim rod. The controller has performed very well and it is planned to install it in the panel board as a permanent fixture. A neutron chamber in hole 37 is used with the controller to provide a power signal, and the No. 45 oil-gear motor in the shim-rod hydraulic system is operated continuously to provide power to actuate the rod. The reactor power can be controlled within smaller limits with the automatic controller than was formerly possible with manual control.

The motor that was struck by lightning on August 28 has been sent to K-25 for repair so that it may serve as a temporary spare until a new motor can be purchased. Bids have been received from four companies for a new motor, and the bids are being studied to determine which meet specifications. Estimated delivery time on the new motors varies between 9 and 18 weeks.

Further study is being made of the need for lightning protection in the fan house, and efforts are being made to have manufacturers' representatives inspect the system. So far, one manufacturer has recommended that condensers and arrestors be placed at the motors, with another set of arrestors placed at an equal distance back from the substation.

TABLE 1. REACTOR DATA

	ORNL Graphite Reactor			LITR		
	September 1954	August 1954	Year to Date	September 1954	August 1954	Year to Date
Total energy, Mwd	98.0	92.3	903.0	64.0	69.1	672.6
Average power/operating hr, kw	3500	3276	3569	2486	2825	2922
Average power/24-hr day, kw	3266	2978	3308	2134	2228	2464
Lost time, %	6.7	9.1	7.3	14.1	21.1	15.7
Excess reactivity	112 inhr	138 inhr		2.6%	2.9%	
Fuel pieces charged	120	88	822	1	0	14
Fuel pieces discharged	96	88	1020	1	0	14
Research samples	96	146	811	9	20	89
Radioisotope samples	183	231	1937	23	25	198

[redacted]

A comparison of the pressure drop across the exit-air filters last month with that experienced this month and with clean filters is shown in Table 2.

TABLE 2. PRESSURE-DROP DATA

	Pressure Drop (in. water gage)		
	Glass Wool	CWS No. 6	Total Across House
9-30-54	1.4	1.3	4.1
8-31-54	1.4	1.3	4.1
Clean filters	1.1	1.3	3.3

Hole 16, which has been used for miscellaneous radioisotope samples, was converted to a sulfur irradiation hole for production of P^{32}.

All the unbonded uranium slugs which were left over from the last reactor loading have been used for radioiodine production, and bonded slugs are now being employed in this process.

The usage of experimental facilities in the ORNL Graphite Reactor is given in Table 3.

Low-Intensity Test Reactor

Down time for the LITR during September was again rather high (14.1%) and was due largely to the shutdowns required by research groups using hole HB-6. A comparison of the August and September shutdowns is given below.

	September	August
Unscheduled shutdowns for operational reasons, hr	2.267	6.550
Regular operational shutdowns, hr	25.017	20.334
Special shutdowns for research, hr	74.184	130.384

The new demineralizer for the recirculated cooling water was completed and put into operation on September 18. The demineralizer system now comprises a small column holding 2 ft^3 of IR 120 cation resin followed by a large mixed-bed column holding approximately 10 ft^3 of Nalcite HCR cation resin and 20 ft^3 of Nalcite SAR anion resin. With the use of the pressure available from the main water line (after the water passes through the air coolers), about 15 gpm can be put through the demineralizer system; however, the operating rate has been only 10 gpm so far. The system has performed extremely well, reducing the radioactivity of the bulk water from about 300,000 to 40,000 counts/min/ml. The resistance of the water in the LITR system (approximately 10,000 gal) has been increased from an average of about 200,000 to 550,000 ohms. The small cation column removes more than 90% of the radioactivity from the water before the stream enters the large mixed-bed column, thus keeping most of the radiation away from the anion resin, which, in the past, has been very sensitive to radiation. Part of the radioactivity in the cooling water may be in colloid form, since it is not removed by the resin bed. Analyses are being made of the water coming through the two resin columns in order to identify the radioactivity leaking through.

The usage of experimental facilities in the LITR is shown in Table 4.

RADIOISOTOPE PRODUCTION AND SALES

Data on the production of processed and unprocessed radioisotopes are given in Tables 5 and 6; special-preparations data are given in Table 7.

Iodine-131 production runs were begun in the new plant in Building 3028 after two trial runs showed that the equipment was operating satisfactorily. The yields obtained were about the same as those experienced with the older equipment, but they improved with each successive run. It is believed that some product was held up by contaminants in the new equipment and that the yields will continue to improve as the contaminants are washed out. In the past, this has been the usual experience after every equipment decontamination.

A small crack that had previously been found in a weld of dissolver "A" was repaired during the month. At the end of the month, however, a leak again developed into the dissolver from its jacket, and the equipment was decontaminated so that it could either be replaced or repaired. Production will be continued by use of duplicate dissolver "B". It was unfortunate that these defects in the welds of the dissolvers occurred, but they have demonstrated that the design philosophy of placing strategic equipment in easily accessible, individual cubicles is very good. Repairs can be very quickly and easily made in the new plant.

TABLE 3. 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

TABLE 3. (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

TABLE 3. (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 4. 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	Experiment being prepared
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	Depleted-uranium exposures by J. Halperin
C-46, 48	Hollow 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 5. PROCESSED RADIOISOTOPE PRODUCTION DURING SEPTEMBER

Product	Source	Amount (mc)	Specific Activity (mc/g)
Argon-37	LITR irradiation	2,840	No carrier added
Chromium-51	LITR irradiation	2,156	2,000
Europium-155	Scrup waste	344	No carrier added
Iodine-131	Graphite Reactor metal	53,674	No carrier added
Iron-59	LITR irradiation	53	6,270*
Iron-59	LITR irradiation	66.6	19
Iron-55	LITR irradiation	908	265
Iron-59	LITR irradiation	41	5,580*
Manganese-54	ORNL 86-in. cyclotron	4.3	No carrier added
Phosphorus-32	Graphite Reactor irradiation	10,170	40,000
Promethium-147	Scrup waste	162	No carrier added
Sodium-24	LITR irradiation	931	2,370
Strontium-89	W metal	215	No carrier added
Yttrium-88	ORNL 86-in. cyclotron	1.5	No carrier added

*Enriched Fe^{58} targets.

The revised directive for the construction of the high-level manipulator cell which is to be used for handling large amounts of Co^{60} was received from the AEC, and construction is scheduled to start by October 19.

A summary of radioisotope shipments is given in Table 8. A new cost-accounting code (3637) has been established to accumulate costs incurred in handling and marketing Co^{60} made in the MTR.

RADIOISOTOPE DEVELOPMENT

I^{131} Plant, Building 3028

Tests were made on all vessels to determine the accuracy of the sampling method by adding known amounts of radioiodine to solutions in the vessels and analyzing several samples. The results are given in Table 9.

The samples were very uniform, but there was a tendency for the assays to be high, especially those for the catch tank. The volumetric calibration of this vessel is probably in error, so the tank will be recalibrated.

The material balance for I^{131} throughout the system was very good except for the amount of I^{131} found in the dissolver after sparging. This quantity, which was calculated from the I^{131} fission yield and the assay of Ba^{140} in the dissolver solution, was consistently low, as compared with the amount that should be present. The method of determining I^{131} in UNH solutions may give low results, so this procedure is now being retested by the Analytical Chemistry Division.

During the third production run after the repair of the dissolver, a leak again developed into the steam jacket. Rather than repair this vessel, which is now believed to have metallurgical defects throughout, future runs will be made in the spare dissolver while a new dissolver is being designed and fabricated. The new dissolver will be made of type 347 stainless steel, rather than of type 309, which will result in slightly higher corrosion rates but which will be less susceptible to cracking around the welds.

Provisions are being made for more copious steam sparging of the dissolver in order to remove more iodine from the dissolved UNH. Methods are also being sought for nearly homogeneous gas generation in the UNH solution, which will increase sparging efficiency and also chemically

TABLE 6. UNPROCESSED RADIOISOTOPE PRODUCTION DURING SEPTEMBER

Product	Units
Service irradiations	55
Antimony-beryllium	1
Arsenic-76	1
Barium-131	3
Cesium-134	1
Chlorine-36	3
Chromium-51	1
Gold-198	42
Iodine-131	5
Iridium-192	22
Mercury-203	2
Molybdenum-99	1
Nickel-63	1
Palladium-109	2
Phosphorus-32	10
Potassium-42	16
Promethium-147	1
Rubidium-86	6
Ruthenium-103	1
Selenium-75	1
Silver-111	2
Sodium-24	22
Strontium-89	1
Sulfur-35	2
Total	202

reduce iodine from its higher valence states to elemental iodine so that the yield from the dissolver will be increased. The use of fine chips of U, Fe, Ni, or similar alloys is now being considered for this purpose.

Separation of Tin and Antimony

Preparations of Sn^{113} are difficult to strip completely free of the daughter Sb^{125} (from 10-min Sn^{125}), even by the sensitive anion-exchange methods or distillation methods now used. It was determined that the carrier-free Sb^{125} is easily removed from a $SnCl_2$ solution by passing the mixture through a column of tin metal chips. Very little tin is picked up by the $SnCl_2$ solution, and it therefore does not significantly change the already low specific activity of the Sn^{113} preparation. The Sb^{125} is deposited on the top section of the tin column. This section of the column is removed, and the carrier-free Sb^{125} is recovered by coprecipitation with CuS, followed by distillation of $SbCl_5$.

TABLE 7. SPECIAL RADIOISOTOPE PREPARATIONS DURING SEPTEMBER

	Number	Amount (curies)
Co^{60} sources	39	412
Ir^{192} sources	33	382
Cs^{137} sources	3	2.1
Sr^{90} sources	4	0.01
Fe^{55} source	1	0.001
Kr^{85} ampoule	1	0.250
A^{37} ampoules	3	0.003
H^3 ampoules	26	13.01
H^3 targets	2	0.265

Cesium Sources

Standard holders for pelleted $Cs^{137}Cl$ sources were redesigned so that press-fitting of the internal and outer plugs would be permitted as well as silver-soldering of the outer plug. No leakage of the press-fit seals could be detected during hot-water immersion or vacuum leakage-rate tests.

Weak Gamma-Ray Sources

Europium-155 is an attractive possibility as a source of low-energy gamma rays for portable x-ray machines. It occurs in very low yield in fission-product mixtures, but it will be produced in practical amounts in the new Fission-Product Pilot Plant. Contamination of the product with Eu^{154} is of interest, since too much of this hard-gamma emitter would destroy the usefulness of Eu^{155}. Samples of fission-product Eu^{155} were prepared and were scanned on the scintillation spectrometer by the Analytical Chemistry Division, and the following results were obtained.

	Relative Amount (%)	Gamma Energies (Mev)
Eu^{155}	80	0.085, 0.040, 0.100
Eu^{154}	20	1.28, 0.78, 0.90

TABLE 8. RADIOISOTOPE SHIPMENTS

	September 1954	August 1954	September 1953	August 1946 Through September 1954
Separated material	751	826	777	48,465
Unseparated material	199	240	165	12,781
Total	950	1066	942	61,246
Nonproject	863	960	825	
Project	66	96	97	
Foreign	21	10	20	
Total	950	1066	942	

TABLE 9. DETERMINATION OF ACCURACY OF SAMPLING METHOD

Vessel	I^{131} Added (mc)	Analysis (mc) of Samples			Error (%)
		1	2	3	
Dissolver	40	42.4	41.2	42.4	+5
Catch tank	20	28.9	28.9	28.9	+44
Still	20	19.4	19.4	19.4	−3
Distillate receiver	6	6.16	6.16	6.16	+3
Caustic scrubber	10	10.8	10.8	10.4	+4
Evaporator	10	10.4	10.5	10.4	+4
Final still	4	4.17	4.19	4.29	+6
Product	4	4.39	4.47	4.52	+11
Catch tank (rerun)	20	24.2	24.2	24.2	+21

Spectrographic analyses showed the above Eu^{155} sample to be contaminated with samarium, but the 0.020-Mev gamma ray of Sm^{151} was not detected.

Enriched Sm^{150} was irradiated to produce Sm^{151}, but upon scanning, only the gamma rays of Eu^{155} (formed by decay of Sm^{155}) and Eu^{154} (from Eu^{153} contaminant) were detected. Enriched Sm^{154} was also irradiated to obtain Eu^{155}. A small amount of Eu^{155} was separated from this target, but it was also contaminated with the ever-present Eu^{154}.

Examination of the samarium fractions from the ion-exchange separation of fission products has not yet shown any significant amount of 0.020-Mev radiation.

Decomposition of Nickel Ferrocyanide

Methods have been sought for freeing cesium from nickel ferrocyanide carrier so that the cesium can be purified by the alum process. It was found that cuprous oxide decomposes the ferrocyanide ion in acid solution, giving a clear solution from which the cesium can be recovered by the alum process.

Fission-Product Pilot Plant

Notification of approval for the construction of the Fission-Product Pilot Plant (FPPP) was received. The directive is now being prepared by the AEC. Work has started on the preparation of the final quantitative process flow sheet. Design

is tentatively scheduled for completion by May 1955.

Technetium Process Development

In the FPPP process, technetium is coprecipitated as the pertechnetate with the use of phenyl arsonium permanganate; this precipitate is then dissolved in acidic acetone–H_2O_2 for further processing. It is desirable to recycle batches for further concentration, but manganous ion (formed during the dissolution of the precipitate) must be removed to prevent formation of MnO_2 precipitate during subsequent permanganate-pertechnetate precipitations. It was found that the acetone solution could be made ammoniacal and that the manganous ion could be precipitated quantitatively as manganese ammonium phosphate without loss of technetium. Technetium can be concentrated by successive steps to the point where the phenyl arsonium pertechnetate can be precipitated without the need for additional permanganate ion.

RADIOACTIVE-WASTE DISPOSAL

A total of 17.0 curies of beta activity was discharged to White Oak Creek from the settling basin and the retention pond (see Table 10); this discharge is 9% greater than that of last month and 47% of the average per month of 1953. The increased activity was the result of a leak from the radioiodine plant in Building 3028 during startup operations.

Radioactive wastes containing 744 curies in a volume of 165,600 gal were discharged into chemical-waste storage pit No. 2 from tank W-8. The total of all wastes discharged to waste storage pit No. 2 to date is 928,458 gal containing 17,422 curies. The chemical-waste system received 113,400 gal of waste during the month.

Alterations to the new hot-waste tank trailer have been completed.

MISCELLANEOUS OPERATIONS

Water Demineralization

Demineralized-water production was 504,680 gal in September, compared with 336,600 gal in August; the large increase was caused by the water demand in filling the Bulk Shielding Reactor pool. Table 11 shows the number of regenerations and the average amount of water passed through each unit during August and September.

TABLE 10. ACTIVITY DISCHARGED TO WHITE OAK CREEK

Source	September 1954		Average per Month, Year to Date		Average per Month, 1953	
	Gallons	Beta Curies	Gallons	Beta Curies	Gallons	Beta Curies
Settling basin	13,380,000	16.4	13,890,000	16.7	19,450,000	24.1
Retention pond	380,000	0.6	500,000	1.7	500,000	11.7
Total	13,760,000	17.0	14,390,000	18.4	19,950,000	35.8

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

	Number of Regenerations		Amount of Water Through Each Unit (gal)	
	September	August	September	August
No. 1 cation	7	4	15,071	44,900
No. 2 cation	4	4	61,325	53,520
No. 1 anion	8	5	20,775	41,130
No. 2 anion	10	8	29,845	28,038

A report from the manufacturer of the defective resin sample submitted last summer has been received, and some preliminary information was given, but no recommendations were made on the prevention of further deterioration of resin in the two 55-ft^3 columns. Efforts will be made to obtain more information on this problem.

The capacity of the plant has been markedly increased by the addition of 5 ft^3 of anion resin to each of the two anion columns. A flow of more than 100 gpm was produced at various times during the month when the Bulk Shielding Reactor pool was being filled. Approximately three days were required to deliver 140,000 gal to the pool, when, at the same time, the demands of normal production were being met.

Bypass valves are being installed on one of the units in order to determine whether leakage through the multiport valves may be a major source of trouble.

Hydrogen Liquefaction

Twenty-two and three-fourths liters of liquid hydrogen was produced in eight runs. However, considerable losses were observed in transferring the hydrogen to the storage flask. With the use of the new liquefier, which is expected to be completed early in October, it is planned to transfer directly into the storage flask instead of through an intermediate flask. When the present system is used, it is necessary to produce about 15 liters in order to obtain 5 liters in the storage flask.

Activation Analyses

A total of 180 requests for information concerning activation analyses has been received; 78 have developed into requests for analyses, 60 of which have been completed.

Shift Services, Equipment Decontamination, Etc.

Approximately 270 man-hours of operators' time was spent in continuing work on shifts, week-ends, and holidays for the various research groups. Two hundred forty man-hours was spent on general equipment decontamination, and 28 man-hours was spent on dissolving U^{235} scrap from the Metallurgy Division for SF accountability purposes.