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FOR

MONTH ENDING AUGUST 31, 1953

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OPERATIONS DIVISION MONTHLY REPORT

for

Month Ending August 31, 1953

by
M. E. Ramsey

DATE ISSUED

OCT 1 2 1953

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CARBIDE AND CARBON CHEMICALS COMPANY
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OPERATIONS DIVISION MONTHLY REPORT

SUMMARY

The activities of the Operations Division for the month ending August 31, 1953 are summarized and indexed below:

1. Lost graphite reactor operating time averaged 7.7%, compared with 6.7% for July (p. 3).
2. Three ruptured slugs were detected and were discharged without difficulty (p. 3).
3. The LITR down time was 17.2%, compared with 7.7% last month. The increased down time was due to water-drop tests and the preparation for 3000-kw operation (p. 3).
4. The maximum fuel temperature reached in a water-drop test at 2300 kw was 92°C (p. 3).
5. Low I^{131} yields were encountered on three runs. Two were probably due to holdup of activity in stopcock grease, and one was due to an error (p. 12).
6. High loses were encountered in processing two P^{32} runs (p. 12).
7. Work on identification of the gases evolved from the Be_3N_2 process was resumed (p. 12).
8. A total of 14.0 curies of beta activity was discharged to White Oak Creek, compared with 21.3 curies last month (p. 14).
9. The next RaLa run is not scheduled until October of this year (p. 15).
10. There were 987 radioisotope shipments this month, compared with 948 during July (p. 16).

REACTOR OPERATIONS DEPARTMENT

OPERATING DATA

	AUGUST 1953	JULY 1953	YEAR TO DATE 1953
ORNL Graphite Reactor			
Reactor power			
Total accumulated (kwhr)	2,541,609	2,554,807	20,201,715
Average kw/operating hr	3,700	3,680	3,770
Average kw/24-hr day	3,416	3,433	3,464
Lost time (%)	7.70	6.69	8.12
Excess reactivity (inhr)	10	75	
Slugs discharged	137	124	867
Slugs charged	137	124	810
Product made (g)	92.76	93.24	736.47
Product discharged (g)	2.92	5.04	22.72
Low-Intensity Test Reactor			
Reactor power			
Total accumulated (kwhr)	1,064,392	1,030,422	7,560,707
Average kw/operating hr	1,728	1,500	1,495
Average kw/24-hr day	1,431	1,385	1,296
Lost time (%)	17.2	7.7	13.3
Position of No. 2 shim rod (in. out)	25.75*	26.635	

*Equivalent to approximately 0.9% excess reactivity.

REACTOR OPERATIONS

ORNL Graphite Reactor

During the month there were two ruptures of bonded slugs from lots that had been tested and found to be beta transformed and one of an unbonded slug that was in the reactor for I^{131} production; pertinent data on the ruptures are shown in Table 1. Further studies are being made by the Metallurgy Division on the growth of slugs discharged from channels in which ruptures occur.

The tantalum slugs being irradiated for the Army Chemical Corps since July 1952 were discharged from the reactor on August 31 and will be held in the canal until the radiation level has decayed sufficiently to transport them to the burial ground.

The old sealed-type chambers in use at the ORNL graphite reactor are being replaced by flow-type chambers similar to those used at the LITR.

An engineering study is being made on increasing the working space at the lid tank.

Installation of the steel windows in Building 3001 was completed during August.

The usage of experimental facilities in the ORNL graphite reactor is shown in Table 2.

Low-Intensity Test Reactor

Work is in progress to increase the power at the LITR. Water-drop tests were made at a power of 1900 kw on August 24 and at 2300 kw on August 31. Both tests were successful, and the temperature of the fuel elements was held well below the boiling point of water in both cases. The maximum temperature recorded in the 2300-kw drop test was 92°C. Extrapolation from 2300 kw to 3000 kw indicates that some of the fuel elements might be raised to the boiling point of water in a drop test.

TABLE 1. SLUG RUPTURES DURING AUGUST

NUMBER	CHANNEL	DATE DISCOVERED	DAYS IN REACTOR	APPROXIMATE TEMPERATURE (°C)	POSITION*	REMARKS
121	1964	8/3/53	84	230	1	Unbonded slug from channel used for radioiodine production
122	1872	8/12/53	30	207	3	Bonded slug from batch 6-215 which tested 100% beta transformed
123	1775	8/17/53	476	242	20	Bonded slug from batch 138 which tested 100% beta transformed

*Determined by counting from west end of row.

Barytes block shielding has been installed in the control room and around part of the seal tank. An additional 1 in. of lead shielding is being applied to the exit water line, and, if necessary, steel plates approximately 1½ in. thick will be installed in the control room and in the experimental rooms. The exact amount of shielding needed will be determined with the power at approximately 3000 kw.

The recent addition of an extra 6-in. suction line to the LITR pumps has appreciably increased the pumping capacity. It is now possible to move more than 1400 gpm with one pump.

The approximate minimum water flows were determined for 1900 and 2300 kw by decreasing the water flow until fluctuations in the position of the regulating rod indicated that a small amount of boiling was taking place in the lattice. The minimum flows are 700 gpm for 1900 kw and 850 gpm for 2300 kw. These compare with a value of 550 to 600 gpm at 1500 kw. Extrapolation of these figures gives a minimum flow of about 1100 gpm at 3000 kw, and the capacity of a single pump is well above this.

On hot days, it is planned to supplement the fluid coolers with the shell and tube heat exchanger.

A filter has been installed so that several hundred gallons of water per minute may be bypassed through it for clarification. The filter was obtained from salvage at Y-12 and has operated very satisfactorily in removing turbidity from the water.

A mixed-bed resin column that was installed in the water system to replace monobed units has resulted in better demineralization but has had a very short operating life. It is planned to redesign the demineralization columns so that the units may be regenerated more readily.

The usage of experimental facilities in the LITR is indicated in Table 3.

TABLE 2. USAGE OF EXPERIMENTAL FACILITIES – ORNL GRAPHITE REACTOR

HOLE NUMBER AND ORIENTATION	DIMENSIONS (in.)	DIVISION ASSIGNED TO	PERSON IN CHARGE	TYPE OF EXPERIMENT OR USAGE
1, north and south	4 by 4			Regulating rod
2, north and south	4 by 4			Regulating rod
3, north and south	4 by 4	Operations	J. A. Cox	Sulfur exposure for radio-phosphorus production
4, north and south	4 by 4	Operations	J. A. Cox	Miscellaneous exposures of special samples
5, north and south	4 by 4			Shim rod
6, north and south	4 by 4			Shim rod
7, vertical	4 by 4			Safety rod
8, vertical	4 by 4			Safety rod
9, vertical	4 by 4			Safety rod
10, vertical	4 by 4	Solid State	J. H. Crawford	Low-temperature sample-exposure facility (not yet installed)
11, vertical	4 by 4	Operations and Chemical Technology	J. P. McBride	Boron shot safety tube and HRP fuel studies (no samples during month)
12, vertical	4 by 4	Chemistry	H. F. McDuttie	HRP fuel studies and general exposures
13, north and south	4 by 4	Operations	J. A. Cox	Target exposures for radio-isotopes and research
14, north and south	4 by 4	Operations	J. A. Cox	Target exposures for radio-isotopes and research
15, north	4 by 4	Solid State (G.E.)	L. E. Stanford (G.E.)	Miscellaneous large-sample exposures
15, south	4 by 4	Solid State	J. C. Wilson	Creep of metals (no samples during month)
16, north and south	4 by 4	Operations	J. A. Cox	Target exposure for radio-isotopes and research
17, north	4 by 4	Unassigned		Empty
17, south	4 by 4	Physics	E. O. Wollan	Neutron polarization
18, north and south	4 by 4	Analytical Chemistry	G. W. Leddicotte	Empty
19, north and south	4 by 4	Solid State	O. Sisman	Water-cooled exposure facility
20, north	4 by 4			Graphite temperature thermocouples
20, south	4 by 4	Solid State	J. C. Wilson	Creep of metals (no samples during month)

TABLE 2 (continued)

HOLE NUMBER AND ORIENTATION	DIMENSIONS (in.)	DIVISION ASSIGNED TO	PERSON IN CHARGE	TYPE OF EXPERIMENT OR USAGE
21, north and south	4 by 4	Operations	J. A. Cox	Sulfur exposure for radio-phosphorus production
22, north	4 by 4	Unassigned		Empty
22, south	4 by 4	Operations	J. A. Cox	Two pneumatic tubes for general usage
30	9 by 9	Solid State (G.E.)	L. E. Stanford (G.E.)	Life tests of equipment in radiation (no tests during month)
31	9 by 9			Blocked by one end of air seal H beam across top of graphite
32	9 by 9			Contains chamber for high-power-level trip circuit
33	9 by 9			Contains chamber for high-power-level trip circuit
34	9 by 9			Contains chamber for No. 2 power-level galvanometer
35	9 by 9			Blocked by one end of air seal H beam across top of graphite
36	9 by 9			Contains chamber for high-power-level trip circuit
37	9 by 9	Training School	H. S. Pomerance	Contains chamber for reactor kinetics study
40	9 by 9			Contains chamber for No. 1 power-level galvanometer
41	6-in. dia			Rear wall suction pressure tap; hole into west plenum
42	6-in. dia			Unit pressure differential tap; hole into west plenum
43	6-in. dia			Unused (inaccessible); hole into west plenum
44	6-in. dia			Unused; hole into west plenum
45	6-in. dia			Gas discharge from hole 22 pneumatic tubes; hole into west plenum

TABLE 2 (continued)

HOLE NUMBER AND ORIENTATION	DIMENSIONS (in.)	DIVISION ASSIGNED TO	PERSON IN CHARGE	TYPE OF EXPERIMENT OR USAGE
46	6-in. dia			Used for viewing west end of graphite with periscope; vertical hole into west plenum
47	6-in. dia			Used for viewing west end of graphite with periscope; vertical hole into west plenum
50, north	4 by 4	Solid State	J. H. Crawford	General sample-exposure facility
50, south	4 by 4	Physics	E. O. Wollan	Neutron spectrometer
51, north	4 by 4	Solid State	J. H. Crawford	Water-cooled U^{235} neutron converter
51, south	4 by 4	Physics	C. G. Shull	Neutron spectrometer
52, north	4 by 4	Solid State	J. H. Crawford	Facility for exposing samples at temperature of liquid nitrogen
53	4 by 4	Solid State (G.E.)	L. E. Stanford (G.E.)	Half-hole for miscellaneous large-sample exposures
54	4 by 4	Solid State (G.E.)	L. E. Stanford (G.E.)	Half-hole for miscellaneous large-sample exposures
55	4 by 4	Solid State (G.E.)	L. E. Stanford (G.E.)	Half-hole for miscellaneous large-sample exposures
56, north	4 by 4	Physics	E. C. Campbell	Fast pneumatic tube
56, south	4 by 4	Physics	H. S. Pomerance	Oscillator for measuring neutron absorption cross sections
57, north	4 by 4	Training School	H. S. Pomerance	General purpose neutron collimator
57, south	4 by 4	Physics	S. Bernstein	Neutron polarization
58, north	4 by 4	Solid State	O. Sisman	Circulating loops for Na and NaK
58, south	4 by 4	Chemistry	H. Levy	Neutron spectrometer
59	4 by 4	Unassigned		Half-hole blocked by work at hole 17, south
60	4 by 4	Chemistry	H. F. McDuffie	Half-hole (no samples during month)

TABLE 2 (continued)

HOLE NUMBER AND ORIENTATION	DIMENSIONS (in.)	DIVISION ASSIGNED TO	PERSON IN CHARGE	TYPE OF EXPERIMENT OR USAGE
61	4 by 4			Half-hole for general large-sample exposure
East animal tunnel				General exposures of large samples to low flux
West animal tunnel				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				Infrequent exposures of biological specimens
West core hole		Physics	E. P. Blizard	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	Solid State		Coaxial cable exposure
C	1.68-in. dia	Unassigned		Charging-face hole – empty
D	1.68-in. dia	Unassigned		Charging-face hole – empty
1768	1.75 in. square	Solid State	R. H. Kernohan	Charging hole containing neutron converter donut; used for general exposures of samples to fast neutron flux
1867	1.75 in. square	Solid State	R. H. Kernohan	Charging hole containing neutron converter donut; used for general exposures of samples to fast neutron flux
1968	1.75 in. square	Solid State	R. H. Kernohan	Charging hole containing neutron converter donut; used for general exposures of samples to fast neutron flux
1069	1.5-in. dia	Unassigned		Charging hole containing an aluminum liner; used for general exposure of suitable samples
2079	1.5-in. dia	Transferred from Solid State to Operations during May 1953	J. A. Cox	Charging hole containing pneumatic tube; used for exposure of research and radioisotope samples

TABLE 2 (continued)

HOLE NUMBER AND ORIENTATION	DIMENSIONS (in.)	DIVISION ASSIGNED TO	PERSON IN CHARGE	TYPE OF EXPERIMENT OR USAGE
0857, 0880, 1484, 1853, 2857, 2880				Charging-face holes containing boron-coated thermopiles for reactor instrumentation
Others				Thirty-four uncharged peripheral holes contain tantalum slugs for the Army; the slugs were discharged at end of month; seven uncharged peripheral holes contain $CaCO_3$ for radioisotope production; 375 uncharged peripheral holes remain unused.

FILTER HOUSE

Table 4 shows a comparison of the pressure drop across the exit air filters last month with the pressure drop this month and with that experienced with clean filters.

FAN HOUSE

The operation of the fan house was normal during August.

RADIOISOTOPES

Stringers 13, 14, and 16 contained 209 cans of target material at the end of August, as compared with 202 cans of target material at the end of July.

Table 5 shows a comparison of the radioisotope and research samples charged into the ORNL graphite reactor during August with those handled in July.

WATER-DEMINERALIZATION PLANT

One unit of the water-demineralization plant has given poor results recently; an overhaul is planned to eliminate valve leakage.

A comparison of the amount of water demineralized during August and July is given below:

	August 1953	July 1953
Water demineralized (gal)	418,560	401,400

TABLE 3. USAGE OF EXPERIMENTAL FACILITIES – LITR

FACILITY NUMBER	TYPE OF FACILITY	DIVISION ASSIGNED TO	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
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	Empty
HB-5	6-in.-ID beam hole	Chemistry	H. F. McDuffie	HRP fuel stability and corrosion tests
HB-6	6-in.-ID beam hole	Chemistry	H. F. McDuffie	HRP fuel stability and corrosion tests
HR-1	Pneumatic tube	Operations	J. A. Cox	General short exposures of research and radio-isotope samples
HR-2	Pneumatic tube	Operations	J. A. Cox	General short exposures of research and radio-isotope 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 (no samples during month)
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 tap plug	Chemistry	H. F. McDuffie	Empty
C-46	Hollow Be core piece with access tube from top plug	Solid State	G. W. Keilholtz	ANP fuel tests
C-48	Hollow Be core piece with access tube from top plug	Solid State	G. W. Keilholtz	ANP fuel tests
C-53	Mg tray in core space	Operations	J. A. Cox	Exposures of research and radioisotope samples
C-57	Mg tray in core space	Operations	J. A. Cox	Exposures of research and radioisotope samples
C-59	Be core piece with four vertical holes	Operations	J. A. Cox	Exposures of research and radioisotope samples

TABLE 3 (continued)

FACILITY NUMBER	TYPE OF FACILITY	DIVISION ASSIGNED TO	PERSON IN CHARGE	TYPE OF EXPERIMENT OR USAGE
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	Inclined low-flux hole	Unassigned		Empty
V-4	Inclined low-flux hole	Unassigned		Empty

TABLE 4. PRESSURE-DROP DATA

DATE	PRESSURE DROP (in. water gage)		
	Glass Wool	CWS No. 6	Total Across House
8/31/53	2.5	2.7	6.4
7/31/53	2.4	2.7	6.4
Clean filters	1.1	1.3	3.3

TABLE 5. RADIOISOTOPE AND RESEARCH SAMPLES

	AUGUST 1953		JULY 1953	
	Research	Radioisotopes	Research	Radioisotopes
Stringers 13, 14, 16	9	204	4	148
Hole 22	62	14	44	6
All other holes	2	30	5	21
Total by groups	73	248	53	175
Total for month	321		228	

CHEMICAL SEPARATIONS AND RADIOISOTOPE DEVELOPMENT DEPARTMENTS

RADIOISOTOPES

Iodine (I^{131} – 8 d)

Seventy-two ORNL slugs which yielded 53,276 mc of I^{131} were processed.

Low yields were received from three of the runs made this month. In two runs, the low yield probably resulted when excessive stopcock grease held up the activity in the distillation flask during the final purification step. The yields of subsequent runs increased after removal of the grease. In the third run, about 2 curies of product was lost when a large portion of the crude material was jetted into the glassware flask containing the acid remains of the previous run.

A new distillation flask was installed to replace the one in which a leak had developed as the result of an improper fitting.

Iodine Development Work, Building 3028

Delivery of process equipment for iodine development work was completed, with the exception of two dissolver reflux condensers and the bubble-cap scrubber column. Fabrication of the primary-still pot and the distillate receiver did not meet specifications, and these pieces were returned to the vendor to be reworked. Installation of equipment in the cells was started on August 10.

Two minor design changes were made. The final-product evaporator was located in cell 1 (final processing cell) instead of in cell 2 because of space considerations, and automatic control valves were installed in the hot- and cold-water lines to the dissolver jackets. These valves will allow automatic control of the dissolver temperature with no increase in the number of control instruments required.

Phosphorus (P^{32} – 14.3 d)

Twenty-one 2500-g cans of bombarded sulfur which yielded 12,822 mc of P^{32} were processed.

High losses were incurred in the processing of two runs. All but about 400 mc from one four-can run was lost when pressure built up in the second evaporator and blew off a Tygon tube. The pressure occurred when heat was applied to the evaporator which contained a small volume of 70% nitric acid and 30% peroxide. Processing of the crude P^{32} through the glassware was difficult on the other run, probably because of the excessive silica in the crude evaporator, which caused losses in the next three purification steps.

Fission-Product Precipitation Process, Building 3515

Work was started on piping changes and repairs to the precipitation process equipment by the one pipefitter made available for this job. In addition to routine repairs, two valves were installed in the underground lines from the Metal Recovery Building to tanks 19 and 20 to prevent accidental discharge of liquids into these tanks.

A comprehensive, process flow sheet was made; revisions are also being recorded on the equipment flow sheet. No further chemical development was done this month; the next scheduled chemical work will be at full scale with inactive and tracer runs in the Building 3515 equipment.

Carbon (C^{14} – 5740 y)

Experiments on the nature of the gas evolved in the Be_3N_2 process were resumed. Ten liters of gas was collected and passed through a silica-gel column at –195°C; the radiocarbon compounds were held on the column. A large portion of the gas (70%) which was passed through the column was hydrogen. The radiocarbon compounds were eluted from the column in two fractions with helium gas; one fraction is principally methane, and the other is an unknown mixture of higher-boiling compounds. These fractions are now ready for further fractionation on a low-temperature microdistillation column.

A sample of Be_3N_2 that was pressed into a pellet was received from Brush Beryllium Company and examined. The pellet was physically and chemically acceptable, with the exception that it contained 1240 ppm of carbon by analysis at ORNL. The Operations Division specification is 100 ppm of carbon, and upon assurance that this would be met, an order was placed for 400 lb of pelleted material.

Zirconium Targets

Steady improvement was made in the preparation of thick zirconium targets on tungsten backings. A thin film of iron was evaporated onto the tungsten, and the zirconium foil was cut to size and

pressed onto the iron surface. When the metal was heated (*in vacuo*) by induction to just below the melting point of zirconium, an intermetallic Zr-Fe-W joint was formed which brazed the zirconium to the tungsten. Good, but not perfect, targets were obtained. Other bonding agents, such as copper, will also be tested.

Deuterium (H^2 – Stable)

Equipment has been installed for the handling of deuterium gas and the preparation of H^2-Zr targets in order to supply the needs of physicists at ORNL and other sites for deuterium targets.

Thulium Target Material

Further examination of the thulium separated from a supposed thulium concentrate revealed that <10% thulium was present and that the balance was ytterbium. The claim for 30% thulium in the original starting material purchased was apparently unfounded. The only source of thulium found in this country is Ames Laboratory, and if thulium cannot be obtained from Ames, it will be necessary to start with gadolinite ore and make the necessary separations.

Processed Radioisotope Production

Table 6 is a list of radioisotope product solutions that were prepared during August.

Special Preparations

The following special preparations were made:

	Number	Total Amount
Co^{60} sources	737	72 curies
Sr^{90} sources	7	31 mc
Tritium ampoules	4	5.4 curies
H^3-Zr targets	4	0.75 curie
A^{37} ampoules	4	4 mc

Miscellaneous Work

Underground storage space (stainless-steel-lined holes) for Be_3N_2 irradiated slugs is under construction.

Installation of equipment for final purification of multicurie amounts of Cs^{137} is in progress.

TABLE 6. RADIOISOTOPES PRODUCED DURING AUGUST

PRODUCT SOLUTION	SOURCE	AMOUNT (mc)	SPECIFIC ACTIVITY (mc/g)
Chromium (Cr^{51} – 26.5 d)	LITR	1,912	2,442
Iron (Fe^{55} – 2.91 y)	Hanford reactors	62	17.1
		112	164
		69.6	21.5
Iron (Fe^{59} – 46.3 d)	Hanford reactors	9.75	2.68
		10.5	15
		28.8	8.8
Manganese (Mn^{52} – 5.8 d)	86-in. cyclotron	2.4	Carrier-free
Manganese (Mn^{54} – 310 d)	86-in. cyclotron	16.6	Carrier-free
Niobium (Nb^{95} – 35 d)	Hanford reactors	103	Carrier-free
		1,366	Carrier-free
Sodium (Na^{24} – 14.9 h)	LITR	1,114	950
		2,107	970
		570	970
Strontium (Sr^{90} – 25 y)	ORNL graphite reactor	570	Carrier-free
Strontium (Sr^{89} – 53 d)	Hanford reactors	96	Carrier-free
Sulfur (S^{35} – 87.1 d)	Hanford reactors	14,100	Carrier-free
Zirconium (Zr^{95} – 65 d)	Hanford reactors	532	Carrier-free

The equipment is being placed in an existing 8-in.-thick lead barricade adjacent to the remote manipulator cell.

Additional scatter shields are being installed on the 6-in. lead barricade. This is part of a general program to reduce the building background (largely soft, scattered radiation) to approximately 1 mr/hr.

New designs are being tried for Sr^{90} beta source holders. An inner source of $Sr^{90}F_2$ fused onto platinum shows much promise. In an effort to eliminate critical soldered joints, stainless steel outer holders will have the thin window machined directly into one end. Satisfactory windows down to 4 mils thick were obtained by using an ordinary lathe.

A rotating plating bath was devised to plate cobalt wafers and cylinders with nickel by the new chemical reduction process. The plated surface was very hard and free from pin holes, as shown by weathering tests in moist oxygen.

Arrangements were made to prepare 5 curies of Ru^{106} for the Chemical Technology Division.

A portable, circulating-chilled-water unit was built for use in the Cs^{137} and Na^{22} purification processes.

RADIOACTIVE-WASTE DISPOSAL

The transfer of uranium sludge as a slurry from tank W-7 to W-10 was continued.

A total of 29,400 gal of chemical-waste concentrate bearing 995 curies of beta activity was transferred from waste tank W-8 to waste storage pit No. 2. The total transferred to date is 172,800 gal containing 6250 curies of beta activity.

After having been postponed for six weeks because of the high radiation levels following the RaLa run, the semiannual inspection and cleanup of the Cottrell precipitator was performed during the month and required a 5-hr shutdown. The air-blower filters were changed, the tubes, relays, and contacts in the high-voltage section were cleaned, the insulators for the high-voltage buss bar were closed, and the porcelain weights on the electrode wires were inspected.

Waste Discharged to White Oak Creek

A total of 14.02 curies of beta activity was discharged to White Oak Creek from the settling basin and the retention pond (see Table 7). This discharge was only 66% of that of last month and was the lowest monthly discharge since December 1951. Some of the discharge this month was caused by a spill of P^{32} in Building 3032.

Chemical-Waste Evaporator

The chemical-waste evaporator presented some difficulties during the month because of variable feed compositions. However, the activity discharged to the settling basin during this month was only 33% of that of last month. Evaporator operation is shown in Table 8; waste-tank inventory is shown in Table 9.

TABLE 7. ACTIVITY DISCHARGED TO WHITE OAK CREEK

DISCHARGED FROM	AUGUST 1953		JULY 1953	
	Gallons	Beta Curies	Gallons	Beta Curies
Settling basin	21,701,000	13.04*	21,299,000	19.61
Retention pond	393,000	0.98	432,000	1.73
Total	22,094,000	14.02	21,731,000	21.34

*Less than 3.04 curies contributed by the waste evaporator.

TABLE 8. WASTE-EVAPORATOR OPERATION

MONTH	SOLUTION FED TO EVAPORATOR (gal)	CONCENTRATE TO W-6 (gal)	VOLUME REDUCTION	BETA CURIES TO EVAPORATOR	BETA CURIES TO SETTLING BASIN
August 1953	212,631	24,076	8.83:1	2,757	3.04*
July 1953	208,755	20,417	10.22:1	15,697	9.10

*This figure is believed to be too high because the analysis of the condensate of one of the runs included in this total was higher than the total activity discharged from the settling basin during the entire week in which the run was made.

Waste-Tank Inventory

TABLE 9. WASTE-TANK INVENTORY

TANKS	CAPACITY (gal)	FREE SPACE (gal)	
		August 1953	July 1953
Hot-Pilot-Plant Storage			
W-3, 13, 14, 15	48,500	32,320	32,320
Chemical-Waste Storage			
W-5	170,000	89,000	80,000
Evaporator-Concentrate Storage			
W-6, 8	340,000	89,000	81,000
Metal-Waste Storage			
W-4, 7, 9, 10	543,000	296,000	272,000

RaLa (Ba^{140} – 12.5 d)

A new product-viewing mirror of polished stainless steel was installed and aligned in the loading cubicle. This new mirror should never have to be replaced because of damage by radiation. The viewing periscope was repaired and reassembled, and the loading cubicle is now ready for the next RaLa run.

The decontamination of "crud" filter No. 1 was completed, the valves were repacked, new disconnect gaskets were installed, and the filter was placed in position. The "crud"-filter manifold valves were lapped to stop all leaks around the gates and between the bodies and the bonnets. The valves were repacked, regasketed, reinstalled, and tested for leakage.

"Crud" filter No. 2 was removed from its position and is being decontaminated in preparation for undergoing the same repairs as those applied to "crud" filter No. 1.

The next RaLa run is not scheduled to be made until sometime in October 1953.

RADIOISOTOPE SALES DEPARTMENT

Radioisotope shipments made during August 1953 are compared in Table 10 with those made during July 1953 and August 1952. A breakdown according to separated and unseparated material (including totals for August 1946 through August 1953) and for project, nonproject, and foreign shipments is also shown.

HANFORD IRRADIATIONS

No samples were received from Hanford during the month of August.

CYCLOTRON RADIOISOTOPES

No cyclotron targets were received during the month of August.

ACTIVATION ANALYSES

A total of 129 requests for information concerning activation analyses has been received; 48 have developed into requests for analyses, 39 of which have been completed.

TABLE 10. RADIOISOTOPE SHIPMENTS

	AUGUST 1953	JULY 1953	AUGUST 1952	AUGUST 1946 TO AUGUST 1953, INCLUSIVE
Separated material	759	759	664	37,482
Unseparated material	228	189	132	10,089
Total	987	948	796	47,571
Nonproject	840	832	698	
Project	103	96	82	
Foreign	44	20	16	
Total	987	948	796	

SF MATERIAL CONTROL

Four shipments consisting of 112 drums containing UNH solutions of depleted uranium were shipped to Mallinckrodt Chemical Works, St. Louis, Missouri, during August. The total uranium content of the 112 drums was 9211 kg. These were the eighteenth through twenty-first shipments of uranium recovered under the Metal Recovery Program and make a total of 46,326 kg shipped to date.

During August, 35 MTR fuel assemblies were shipped to Phillips Petroleum Company, Scoville, Idaho. This makes a total of 510 fuel assemblies shipped to date; since no control rods were shipped this month, the total number shipped to date remains at 54.

Important quantities of fissionable material were received from Y-12 during August, namely, 2 kg of contained U^{235} in the form of metal to be used in fabricating LITR assemblies and 5 kg of contained U^{235} in the form of metal to be used in fabricating Tower Shielding Facility assemblies.

The second shipment of spent LITR radioactive fuel elements was made during August to the American Cyanamid Company, Scoville, Idaho, for recovery. The shipment consisted of six LITR fuel assemblies and a partial LITR fuel assembly.

Progress is being made on the rough draft of the new *SF Accountability Manual*. Originally it was planned to issue each volume separately as it was completed, but now it is planned to issue the entire manual at one time.

At the request of the AEC, the SF office prepared and submitted a 24-page report on "Fissionable Materials Not in Production Channels" for FY 1953. This report included a quarterly breakdown, by projects, of material on hand, material received, and material shipped. It also included substantiating documentary evidence for transactions. A similar report is being assembled for FY 1954.

Two surveys now in progress are to determine the ORNL X-10 and Y-12 needs of special materials for the next three years and to determine the ORNL X-10 and Y-12 basic and special quota of fissionable materials for CY 1954.

From July 29 through August 28, 1953, an SF survey was conducted by the AEC, ORO, SF survey group. This survey consisted largely of an audit of the SF office records and a spot check of material balance areas.

SF surveys during the month consisted in visiting 13 persons possessing SF material. The material in their possession was checked and weighed when feasible, and no apparent discrepancies were encountered. In addition, the records of four analytical laboratories were audited; this disclosed that all records were in good order and that proper accounting had been made for all samples.

During August, there were 16 receipts and 35 outgoing shipments, compared with 25 receipts and 33 shipments last month. Tables 11 and 12 are summaries of receipts and shipments for August.

TABLE 11. SF MATERIALS RECEIVED

FROM	MATERIAL	NUMBER OF SHIPMENTS	AMOUNT (g)
Argonne National Laboratory, ANL	Thorium	1	70.00
Battelle Memorial Institute, BMI	Thorium	1	2,040.00
Carbide and Carbon Chemicals Co., K-25, CCC	Depleted uranium	1	229.00
Carbide and Carbon Chemicals Co., Y-12, CYT	Enriched uranium	3	7,002.90
	Plutonium	2	0.16
	Normal uranium	4	6,639.00
	Thorium	1	74.00
North American Aviation, Inc., DNA	Normal uranium	1	20.00
Phillips Petroleum Co., MTI	Normal uranium	1	0.21
	Enriched uranium	1	1.94
	Thorium		152.51

TABLE 12. SF MATERIALS SHIPPED

TO	MATERIAL	NUMBER OF SHIPMENTS	AMOUNT (g)
American Cyanamid Co., CPI	Enriched uranium	1	817.42
Argonne National Laboratory, ANL	Depleted uranium	1	2,190.40
	Plutonium		0.70
Brookhaven Nationol Laboratory, BNL	U^{233}	1	2.67
	Depleted uranium	1	4.82
	Plutonium		0.002
Carbide and Carbon Chemicals Co., K-25, CCC	Depleted uranium	1	285.93
Carbide and Carbon Chemicals Co., Y-12, CYT	Enriched uranium	9	13.19
	Plutonium	1	0.15
	Thorium	1	238.00
	Normal uranium	2	951.92
	Depleted uranium	1	18.00
Iowa State College, ISC	Normal uranium	1	120.40
Mallinckrodt Chemical Works, MCW	Depleted uranium	4	9,210,842.00
North American Aviation, Inc., DNA	Normal uranium	1	104.00
Phillips Petroleum Co., MTI	Enriched uranium	7	5,883.67
USAEC, Oak Ridge Operations Office, CPA	Normal uranium	2	0.84
USAEC, San Francisco Operations Office, SAN	U^{233}	1	0.0004