ORNL 1037
Progress Report

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AEC RESEARCH AND DEVELOPMENT REPORT

OPERATIONS DIVISION

MONTHLY REPORT

FOR

Month Ending May 31, 1951

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
CARBIDE AND CARBON CHEMICALS COMPANY
A DIVISION OF UNION CARBIDE AND CARBON CORPORATION
UCC
POST OFFICE BOX P
OAK RIDGE, TENNESSEE

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OPERATIONS DIVISION

MONTHLY REPORT

for

Month Ending May 31, 1951

by

M. E. Ramsey

DATE ISSUED

JUN 21 1951

OAK RIDGE NATIONAL LABORATORY
Operated by
CARBIDE AND CARBON CHEMICALS COMPANY
A Division of Union Carbide and Carbon Corporation
Post Office Box P
Oak Ridge, Tennessee

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ORNL-1037
PROGRESS REPORT

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SUMMARY

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PROGRESS REPORT

1. Lost pile-operating time averaged 8.2%, compared to 13.4% in April and 10.5% for the year-to-date. (Page 5.)
2. No ruptured slugs were detected during the month. (Page 5.)
3. The container of an HRE-type solution failed during exposure in the LITR and caused minor difficulties. (Page 6.)
4. The LITR is being operated at 770-790 KW during "full power" runs. (Page 7.)
5. All the CWS #6 filter medium has now been replaced with new CWS #6 medium. It was in service approximately two and one half years. (Page 7.)
6. A small amount of corrosion has been detected on the No. 2 fan bearings. (Page 8.)
7. The I^{131} equipment did not operate satisfactorily during the month. A supply of I^{131} was accumulated and the equipment has been shut down for repairs. (Pages 10 and 11.)
8. Design work for a new I^{131} plant is progressing satisfactorily. (Pages 10 and 11.)
9. The installation of equipment for separations from Chalk River waste has been completed. (Page 15.)
10. The activity discharged to White Oak Creek was 35.3 curies, compared to 14.2 curies during the previous month. The source of the increased activity is not known but appears to be associated with RaLa operations. (Page 19.)

[redacted]

SUMMARY - (continued)

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PROGRESS REPORT

11. The evaporator is being operated satisfactorily at almost twice its designed capacity to process the large volumes of wastes being received currently. (Page 20.)

12. RaLa Run No. 44 was started on May 13, 1951, and shipped on May 21, 1951, as a nitrate with 3,182 curies of RaLa. The run was unduly complicated by failure of a plug valve necessitating a large amount of reprocessing. (Pages 21, 22, and 23.)

13. The resin cubicle (#200) which contains the faulty valve is being decontaminated prior to repairs. (Pages 21, 22, and 23.)

14. There were 820 radioisotope shipments, compared to 867 last month. (Page 24.)

[redacted]

A. PILE DEPARTMENT

I. Operating Data:

	MAY 1951	APRIL 1951	YEAR-TO-DATE 1951
Total Accumulated KWH	2,402,620	2,335,806	12,427,353
Average KW/Operating hour	3517.65	3746.7	3832.95
Average KW/24-Hour Day	3229.33	3244.2	3429.18
Percent Lost Time	8.2	13.4	10.5
Excess Pile Reactivity	~120 inhours	~165 inhours	
Slugs Discharged	40	381	2590
Slugs Charged	48	265	2586
Product Made (Grams)	87.69	85.25	453.55
Product Discharged (Grams)	0.48	36.73	336.13

II. Pile Operations:

The average pile power per operating hour for the month was 3,517.7 KW, compared with 3,746.7 KW for April, 1951.

The pile-down time was 8.2%, compared with 13.4% in April, 1951, and 10.5% for the year-to-date. The decrease in down time was partially due to the fact that there were only four Monday shutdowns during the month, compared to five last month. Also, fewer shutdowns were required by research personnel.

There were no ruptured slugs found during the month. The total number detected to date remains at eighty-seven.

A few bonded slugs have been completed at Y-12. It has just been learned that some of the uranium slugs show evidence of cracking after machining. The present procedure is to inspect these slugs visually and to discard those having cracks. At the present time there are approximately fifty-eight hundred slugs on hand, and these are expected to last only a few months. It does not appear at present that bonded slugs will be available in time to raise the pile power during the summer months.

II. Pile Operations: - (continued)

Tentative requests have been received for cutting a number of Hanford slugs for ANL and for K-25. In view of the difficulty experienced with contamination from this operation, it is planned to revamp the slug cutter to reduce chances of contamination in the future. Charges will be made for the cutting service in the future.

Approximately one hundred and forty special slugs were discharged for the Chemical Corps on May 14, 1951. Three special slugs were discharged for the Chemical Corps on May 21, 1951, and twenty-five slugs of tantalum are being irradiated for the Oak Ridge Institute of Nuclear Studies. These are expected to be discharged approximately June 25, 1951. In addition, consideration is being given to loading 1,250 curies of Co^{60} as a service to the Medical Unit of the ORINS.

An HRE-type solution was irradiated by the Chemistry group of the HRE in the Low Intensity Training Reactor on May 7-11 and May 22-23, 1951. The first run was completed and removed without incident, but the second run failed on May 23 when the container leaked, allowing radioactive gas to contaminate the LITR area. The contamination was soon dissipated and all that remained at the LITR on the following day was a few spots around the top plug reading approximately 200 mr/hr at contact. These contaminated spots were quickly removed and the experiment removed without further mishap.

New magnets for the LITR are being fabricated by Westinghouse. One of these has been returned, and the second magnet top is being assembled into a magnet.

II. Pile Operations: - (continued)

Heat balances have been completed by two separate groups and results agree quite closely. At the present setting of N_F the power is 770-790 KW.

In addition to the beam hole experiments, experiments are now being planned for all beam holes, and a number of proposals have been made for irradiations in the reactor lattice in specially-designed elements. Two experiments in Be elements are planned in addition to one irradiation in an aluminum-graphite element, one irradiation in a special fuel element, and two stringers of graphite-aluminum for miscellaneous small sample irradiations.

In preparing for regular operation of the LITR, the following major jobs are underway: (1) Instrument repair and clean-up, (2) addition of extra shielding, (3) provision of retention basin for cooling water, (4) ventilation system for experiments and pit, (5) provision of extra cooling capacity, and (6) additional safety instruments.

III. Filter House:

Replacement of the No. 2 filter filter medium (CWS #6) has been completed following approximately two and one half years' service from the original No. 2 filters. This reduced the pressure drop across the No. 2 filters from over three inches to 1.2 inches of water.

A new filter developed by the A. D. Little Company is understood to be comparable to the CWS #6 filter and to cost only about one half as much (about $36.00 each unit with two hundred units being used in the Filter House). It is planned to use these filters in place of the CWS filters in the future.

III. Filter House: - (continued)

Since the new No. 2 filters just installed are capable of withstanding temperatures of approximately 275° F., it will be possible to stop adding cooling water to the exit air stream.

The following table compares the pressure drop across the exit air filters last month with this month and that experienced when all filters were clean:

Date	Glass Wool (In. w.g.)	CWS #6 (In. w.g.)	Total Across House
5-31-51	2.7	1.2	5.3
4-30-51	2.6	3.1	7.2
Clean Filters	1.1	1.0	3.3

Static pressure decreased from 40.4 to 38.3 inches w.g.

IV. Fan House:

The old No. 3 900-h.p. motor has been shipped to Allis-Chalmers for installation of new stator coils and general repair. It was impossible to remove the old coils as had been planned, and the motor was shipped with the old coils still in place.

On May 14, it was noted that the bearing temperature of the No. 2 fan had been running high; accordingly, the bearings were inspected. Evidence of corrosion was found. To correct this, the bearings were cleaned, the oil system cleaned and flushed, and new oil (Navy spec. 2135) added. On May 21, the No. 3 fan bearing on the south side flooded. This, apparently, had been caused by too high an oil pressure and temperature. It is planned to add orifices in the oil line supplying this bearing similar to those installed in the No. 2 fan at the time the fan was first installed.

V. Radioisotopes:

The following table is a comparison of the radioisotope and research samples charged into the pile during May, 1951, with those handled in April, 1951:

	MAY, 1951		APRIL, 1951	
	Research	Radioisotopes	Research	Radioisotopes
Stringers 13, 14, and 16	10	139	22	170
Hole 22	75	8	72	10
All Other Holes	4	23	7	25
TOTAL BY GROUPS	89	170	101	205
TOTAL FOR MONTH	259		306	

At the end of May, 1951, there were 361 cans of target material in Stringers 13, 14, and 16, compared to 364 cans of target material in these stringers at the end of April, 1951.

VI. Water Demineralization Building:

The operation of the building was normal with 689,460 gallons of water being demineralized of which 19,150 gallons were also deaerated.

PRODUCED (Gallons)	MAY, 1951	APRIL, 1951	YEAR-TO-DATE
Demineralized	689,460	625,260	3,239,780
Deaerated	19,150	34,360	217,750

B. CHEMICAL SEPARATIONS AND RADIOISOTOPE DEVELOPMENT DEPARTMENTS

I. Radioisotopes:

1. Iodine (I^{131} - 8d)

Seventy-one ORNL slugs and three Hanford slugs were processed this month and about 42,917 millicuries of product were shipped. All products were within specifications.

Low yields were experienced on all runs again this month. One run, using eight ORNL slugs, was made and yielded no product. When the crude material was transferred to the glassware for purification, it was found to be acid and hence contained essentially no I^{131}. One run was split when it reached the glassware, and the first three still collections were processed yielding about one half of a normal amount of product. The crude material from the last two still collections was processed separately, and very little product was obtained.

The three Hanford slugs were processed, one slug at a time, and the scrubber solution held and processed with the last slug. A total of about sixty-seven curies was produced, all but about ten or twelve curies recovered from the scrubber solution. This amount of I^{131} is enough to meet shipments for about two weeks, allowing the equipment to be decontaminated and inspected for mechanical failure.

Upon investigation, it was found that the large dissolver gasket and the gasket on the bottom of the reflux condenser were faulty, allowing a sweep of air to go into the dissolver and on through the off-gas system. These leaks have been repaired, and the leaking still condenser replaced. The remainder of the equipment will be tested and a dummy run made before the cell is again closed for use.

I. Radioisotopes: - (continued)

1. Iodine Development Work

The Engineering Department has made a comprehensive study of this project and is now at the point of completing many of the drawings on structural, piping, and vessels. The Radioisotope Development Department furnished design criteria based on former experience and experimental and calculated data.

An I^{131} tracer run was made in the experimental glassware to determine the efficiency of cold water scrubbing of very low concentrations of iodine in gas streams. Results indicate that the water scrubber is feasible. Data for actual design of the scrubber are not sufficient. Further runs under various operating conditions are planned.

Installation of the 1,000-gallon metal-waste holdup tank was completed but not tested.

A sample Tri-Clover quick-opening flange unit was received but no test work has been started.

2. Phosphorus (P^{32} - 14.3d)

Sixteen 2,000-gram cans of irradiated sulfur were processed and 8,359 millicuries shipped. All products were within specifications.

The first new 2,500-gram, round sulfur bombardment cans were pulled from the pile at the end of the month. All cans will be of this type in the future.

I. Radioisotopes: - (continued)

3. Carbon (C^{14} - 5700y)

During May, 1,218.9 millicuries of C^{14} were produced. A small amount of $NaC^{14}N$ was prepared from the supernate from the scrubber between dissolver and copper oxide furnace; cyanide is being collected until there is enough for a purification run.

Carbon Development Work

The equipment for recovery of beryllium from waste of carbon 14 runs is complete. Run sheets for the operation of this equipment, as well as for the C^{14} production equipment, are being prepared.

Tests on a different and more convenient procedure for melting the aluminum jackets from the slugs have been completed, and the drawing necessary to effect this change is complete.

Beryllium chloride, prepared from pure metal, was dissolved in liquid ammonia and the ammonia allowed to evaporate. The residue, beryllium chloride ammoniate, was then heated to an atmosphere of ammonia to 1,000° C. The compound formed is white, stable at 1,000° C., and does not collect moisture when exposed to air. Presumptive tests indicate that a stable nitrogen compound of beryllium may have been formed.

4. Calcium (Ca^{45} - 87.1d)

Calcium was produced with the following analysis:

	#1	#2
Concentration	4.07 mc/ml	3.50 mc/ml
Total Ca^{45}	407 mc	157.5 mc
Specific Activity	54 mc/gm	54.2 mc
Heavy Metals	< 10 ppm	< 10 ppm
Acidity	0.361 N (HCl)	0.266 N (HCl)
Contamination	< 0.1%	None

I. Radioisotopes: - (continued)

5. Chlorine (Cl^{36} - $\sim 10^6$y)

Chlorine was separated with the following analysis:

	#1	#2	#3
Concentration	0.00417 mc/ml	0.00375 mc/ml	0.02095 mc/ml
Total Cl^{36}	0.208 mc	0.375 mc	0.798 mc
Specific Activity	0.31 mc/gm	0.48 mc/gm	0.266 mc/gm
Total Solids	0.0 mg/ml	0.0 mg/ml	0.0 mg/ml
Acidity	0.350 N (HCl)	0.215 N (HCl)	2.23 N (HCl)
Contamination	None	None	< 0.1%

6. Iron (Fe^{55-59} - 4y, 46.3d)

Iron was produced with the following analysis:

Concentration Fe^{55}	0.13 mc/ml
Concentration Fe^{59}	0.12 mc/ml
Total Fe^{55}	16.25 mc
Total Fe^{59}	15.0 mc
Specific Activity Fe^{55}	5.2 mc/gm
Specific Activity Fe^{59}	4.8 mc/gm
Acidity	0.844 N (HCl)
Co^{60}	0.00011 mc/ml

7. Sulfur (S^{35} - 87.1d)

Carrier-free sulfur was made with the following analysis:

	#1	#2
Concentration	119.5 mc/ml	138.2 mc/ml
Total S^{35}	17,900 mc	20,700 mc
Contamination	None	< 0.1%
Total Solids	0.0 mg/ml	0.0 mg/ml
SO_4	0.0 mg/ml	0.0 mg/ml
Acidity	0.02 N (HCl)	0.015 N (HCl)

8. Scandium (Sc^{46} - 85d)

Scandium was produced with the following analysis:

Concentration	6.98 mc/ml
Total Sc^{46}	522 mc
Specific Activity	1150 mc/gm
Acidity	2.48 N (HCl)

9. Argon (A^{37} - 34d)

Two samples were packaged for shipment. Equipment being set up for analysis of this isotope is approximately 50% complete.

[redacted]

I. Radioisotopes: - (continued)

10. Tritium (H^3 - 12y)

The tritium system was extensively revised during May. The revisions were for the purpose of improving packaging methods and to provide a more flexible system. This system is now ready to package He^3 as well as tritium.

11. Fission Products

Run #SS-28 was completed. Three main fractions were removed as follows: ruthenium (120 mc) in the column effluent which was concentrated by evaporation; rare earths (1368 mc), and strontium (819 mc).

No purification runs were made but approximately 100 millicuries La^{140} were milked from Ba^{140} to fill a special order.

During a special separation Zr-Nb for the Chemical Technology Division, using 5% mandelic acid solution as an elution agent, preferential complexing of Zr and Nb was noted. The ratio of Zr to Nb was 11.4:1; using oxalic acid the ratio is ordinarily about 1:1. This indicates that a resin column separation procedure for Zr and Nb using mandelic acid elutriant could probably be developed.

12. Ruthenium (Ru^{106} - 1.0y)

Ruthenium was purified with the following analysis:

Concentration	1.52 mc/ml
Total Ru^{106}	228 mc
Specific Activity	152,000 mc/gm
Gross Alpha	150 c/m/ml
Pu	96 c/m/ml
Acidity	4.26 N (HCl)

I. Radioisotopes: - (continued)

13. Chalk River Waste Separation

The installation of equipment was completed and two test chemical runs have been made. Particular attention is being given to the behavior of chromic and chromate ions in the process. All equipment performed satisfactorily except the effluent evaporator, which is being replaced by one of larger capacity. Operating instruction sheets have been written up and training of operators is in progress.

14. Source Preparations

a. Co^{60} sources were loaded in special holders as follows:

USAF School of Aviation Medicine	3 sources, 1-200 mc, 2-100 mc
Ford Motor Company	2 sources, 500 mc each
Penn. State College	1 source, 500 mc
Crucible Steel Company	1 source, 200 mc
X-Ray Inc.	2 sources, 1-500 mc, 1-100 mc
National Bureau of Standards	1 source, 500 mc
Western Reserve University	1 source, 500 mc
Federal Steel Products Company	1 source, 500 mc
Babcock & Wilcox Company	2 sources, 300 mc each
National Tank Company	1 source, 500 mc
St. John's X-Ray Laboratory	1 source, 500 mc
J. T. Mitchell	1 source, 1 curie
W. K. Mitchell & Co., Inc.	1 source, 500 mc

b. S^{35} sources were prepared as follows:

Barat College - two sources, 1 mc and 20 mc - material dried on polystyrene sheet covered with Scotch tape.

c. A Sr^{90} source was prepared for Barat College - 10 mc - dried on polystyrene sheet covered with Scotch tape.

15. Packaging

One package of 5.26 curies of tritium was made for the University of California.

I. Radioisotopes: - (continued)

16. Services

a. Twelve samples of glass from Pittsburgh Plate Glass Company were exposed to various amounts of gamma radiation.

b. Studies were made on moisture in Rb_2CO_3 samples canned with various types of crimping. It was concluded the rubidium carbonate target material must be dried and sealed in quartz ampoules for irradiation.

17. General

a. Experimental Work on TBP Process

Installation of the experimental pulse column was completed. Tests will be made as soon as structural design of the fission product cell is finished.

The special bellows feed pump was fabricated and tested. When the "cold" side pumping rate is 80 ml/min, the "hot" side delivers 65 ml/min for an efficiency of 81%. The polystyrene pulsing unit, actuated by a slow-speed chart-drive motor, performed well under test.

Additional information on the Carson-Cerveny micro-bellows pumps was received. Units of larger capacity are available.

Test runs will be made in the near future to observe equipment performance and to determine HETS values of the system. Low-level UNH tracer runs are planned to check the distribution of fission products.

I. Radioisotopes: - (continued)

17. General

b. High-Level Barricade Improvements

The remote control transfer devices were installed in the high-level barricades of Buildings 3029 and 3030. The twenty-foot hot barricade in Building 3030 was found to have numerous radiation leaks which are being repaired.

c. Glass Valve

A second model of a magnetically-operated glass valve was fabricated but it is not entirely satisfactory.

d. Fission Product Cell Repairs

Modification of the periscope elevator in the fission product cell in Building 3026 is complete except for installation of two pulleys.

e. General Repairs

The vent from the Radioisotope Area waste metal hold-up tank was tied into the hot off-gas system at the four-inch spare connection. Also, the inspection platform around the main insulators of the hot off-gas electrical precipitator was completed.

The north vacuum pump in Building 3034 was dismantled this month and found to have badly worn bearings. No spare parts were available. These are now on emergency order and will be installed on arrival.

II. Tank Farm:

1. General

a. All work was completed on the installation of the three new tanks in the South Tank Farm with the exception of installation of the gauge boards, tying them into the system, and completing the backfilling. The tie-in will be completed at the earliest convenience of operations in Building 3026.

b. The transfer of precipitated uranium from W-7 to W-10 tanks has been held up this month due to lack of free space in W-10. As soon as the supernate from this tank can be put into the chemical waste system, the transfer of precipitate to W-10 can continue.

c. The new metal waste tank in the Radioisotope Area was tied into W-9 tank this month.

d. Work was begun on the installation of two Brown recorders at the evaporator in the Tank Farm. The evaporator will be the central location for recording the liquid levels of all the new waste tanks being installed under the Plan "H" Program.

e. The indicating lights for the multiple liquid level probes in the evaporator have been installed on the panel board.

f. Landscaping has begun, covering former excavations, in the Tank Farm.

II. Tank Farm: - (continued)

2. Wastes Discharged to White Oak Creek

A total of 35.26 curies of beta activity was discharged from the Settling Basin this month. The origin of this activity, at present, has not been located. The beginning of the activity coincided with the beginning of the dissolving of the Hanford slugs for the RaLa run in Building 3026, and continued sporadically throughout the entire run. An intensive search has been made, attempting to locate the leak or possible tie-in from some part of the RaLa equipment to the Settling Basin, without success. The investigation is being continued.

The method of calculation of curie discharge from the Settling Basin was changed this month. Previously, curie discharge was based on the inlet flow to the Basin and the activity of the outlet flow. Since the new outlet weir box has been installed and proportional sampler operating, the activity has been calculated based on the flow at this point and the sample from the proportional sampler. This method has been compared with the former method of calculation. The results of both calculations compare very closely, but it is believed that the new method is more accurate.

ACTIVITY DISCHARGED TO WHITE OAK CREEK

	MAY, 1951		APRIL, 1951	
Discharged From	Gallons	Beta Curies	Gallons	Beta Curies
Settling Basin	23,688,000	35.26*	20,794,000	13.95*
Retention Pond	350,928	0.15	465,161	0.22
		35.41		14.17
*Contributed by Evaporator		0.57		1.37

II. Tank Farm: - (continued)

3. Chemical Waste Evaporator

At the end of the month, the evaporator was operating at almost twice its designed evaporation capacity in order to reduce the volume of waste on hand. Free space is critical in the chemical waste system with the RaLa process operating, the Hot Pilot Plant sending large volumes wastes to W-5, and decontamination going on in the I^{131} equipment. Besides these unusually heavy loads, there have been the normal plant wastes from other sources.

WASTE EVAPORATOR OPERATION

Gallons Fed to Evaporator	Gallons of Concentrate to W-6	Volume Reduction	Beta Curies to Evaporator	Beta Curies to Settling Basin
MAY - 202,362	19,766	9.2:1	6,592.20	0.57
APR. - 213,422	12,461	16.1:1	2,355.77	1.37

One run was not reported in the above compilation due to the samples having been lost during analysis.

4. Waste Tank Inventory

HOT PILOT PLANT STORAGE

Tanks	Gallons Capacity	Gallons In	Gallons Out	Discharged to	Free Space
W-3, 14, 14, 15	48,500	740	150	3026-C	7,900
CHEMICAL WASTE STORAGE					
W-5	170,000	237,162	202,362	Evaporator	48,000
EVAPORATOR CONCENTRATE STORAGE					
W-6, 8	340,000	7,200	19,200	Evaporator	78,000
METAL WASTE STORAGE					
W-4, 7, 9, 10	543,000	26,688	0	-----	171,552

[redacted]

III. RaLa (Ba^{140} - 12.5d):

Resin Cubicle #300 was tested with two dummy runs during which many leaks were found and repaired. Following testing and repairs, the cubicle was lowered into position and tied in to the services for use as a spare unit during RaLa Run No. 44.

RaLa Run No. 44 started on May 13, 1951, with the loading of seventy-three Hanford four-inch slugs. These were dissolved in two large batches and a slug heels batch, the latter to remove any traces of uranium left undissolved.

The run progressed very well with exceptionally low losses through the new filters and almost completely through the new cubicle until a plastic plug valve failed in changing its position prior to stripping the product from the resin column and sending it to the product evaporator tank. The product was found in two separate waste tanks.

In attempting to recover the wastes containing product from the resin cubicle and combine it with other product left behind in Cell A, much difficulty was encountered. Very high losses were obtained in all steps of the recovery process. During the regular run these waste losses were extremely low. After several recovery attempts, it became apparent that the revised procedure does not lend itself to good recovery after the metathesized product has been put into solution in the presence of Versene.

Because of the several recovery attempts, the product came through the spare #300 resin cubicle, put into use after the #200 cubicle breakdown, in two batches which were combined in the product evaporator tank as one product. L.S.T. was finally reached at 1322 on May 20, 1951.

III. RaLa (Ba^{140} - 12.5d): - (continued)

The run was shipped on May 21, 1951, at 10:00 a.m. as a nitrate with a product content of 3,182 curies. An analytical summary follows:

Slugs Loaded: - 73 Hanford 4" Slugs

Slugs Dissolved: - 69.5 (by analysis)

L. S. T. - 1322, May 20, 1951

CELL A	Curies	Percent
Total Product Dissolved	13,131	100.0
Cell A Losses	4,305	32.8
Resin Column Losses	1,869	14.2
Total Losses Accounted For	6,174	47.0
Product Shipped	3,157	24.0
Losses Unaccounted For	3,800	29.0
Material Balance thru Product Evaporator		71.8

As soon as the run was shipped, an evaporator tank rinse was taken for small radioisotope shipments. During this operation the product cone manipulator broke and was easily repaired after slight decontamination. A brazed joint broke on a connection from a flexible shaft to a gear.

Decontamination was begun on the #200 resin cubicle. During this decontamination, the flexible shaft snapped causing another valve to fail. This was temporarily repaired until the decontamination could be finished. The decontamination was attempted using very weak solutions in order to minimize the damage to equipment. The cubicle has been brought down to much lower levels of radiation, but it is still too highly contaminated to carry out any repairs. Further decontamination in place has failed and it will be removed to burial ground #3 for disassembly, decay, and further decontamination if possible.

III. RaLa (Ba^{140} - 12.5d): - (continued)

No decision has yet been made as to what repairs and alterations will be made to the #200 cubicle. However, as extensive repairs as possible will be made with working time available. Valuable information is being obtained for the redesign of the cubicles if this is ever desirable.

A formerly contaminated working area east of Cell A has been completely decontaminated and repaired. It is once again available for use.

The cell block sides and top have been completely repainted.

C. RADIOISOTOPE CONTROL DEPARTMENT

I. General:

During May, 1951, there were 820 radioisotope shipments, compared with 867 during April, 1951, and 791 during May, 1950.

The breakdown according to separated and unseparated material is as follows:

	May 1951	April 1951	May 1950	August, 1946, to May, 1951, Inclusive
Separated Material 706-D Area	657	679	561	18,075
Unseparated Material 100 Area	163	188	230	5,525
TOTAL SHIPMENTS	820	867	791	23,600

The breakdown of shipments according to non-project, project, and foreign shipments is as follows:

	May 1951	April 1951	May 1950
Non-Project	618	665	596
Project	180	169	171
Foreign	22	33	24
	820	867	791

II. Hanford Irradiations:

The following radioisotope samples were received from Hanford during May, 1951:

Sample No.	Material	Date Discharged	Date Received
ORNL-111	Metallic Co (18 pcs)	2-19-51 (8) 4-18-51 (10)	5-2-51
ORNL-13	Beryllium Nitride (2 pcs)	2-7-51	5-2-51
ORNL-28	Iron (1 pc)	4-11-51	5-2-51
ORNL-81	Zinc (1 pc)	4-11-51	5-2-51
ORNL-88	Tin (1 pc)	4-11-51	5-2-51
ORNL-86	Thallium (2 pcs)	4-11-51	5-2-51
ORNL-82	Nickel	May, 1951	5-13-51
ORNL-84	Silver	May, 1951	5-13-51
ORNL-139	Indium Metal	May, 1951	5-13-51

III. Cyclotron Radioisotopes:

Following is a list of the outstanding orders for cyclotron radioisotopes now on hand:

Material	Amount	Status
Na 22	2 mc	Material has been requested.
Mn 54	6 mc	Material in process.
Co 57	1.1 mc	Material in process.

BOMBARDMENTS RECEIVED

	M. I. T.		U. of CALIF.		U. of PITTSBURGH		WASHINGTON U.	
	Bombardments	Beam Hours	Bombardments	Beam Hours	Bombardments	Beam Hours	Bombardments	Beam Hours
Be 7					9	285.00		
Na 22	1	109.75			5	201.75	4	300.00
Mn 52					2	20.00		
Mn 54							4	200.00
Co 57							3	100.00
Fe 59			5	255.60				
Zn 65	1	100.00						
Sr 85	2	59.75			1	10.00		
As 73					1	10.00		
I 125							2	60.00
Molybdenum Metal					1	13.00	3	30.00
Sulfur					1	2.00		
TOTAL RECEIVED	4	269.50	5	255.60	20	541.75	16	690.00

REQUESTED BUT NOT RECEIVED

Be 7			1	50.00				
Na 22	1	100.00						
Co 56-57-58	1	10.00						
Zn 65			1	40.00				
Fe 59			1	40.00				
TOTAL HOURS OUTSTANDING (Not Received or Requested)		370.50		364.40		208.25		60.00

[redacted]

III. Cyclotron Radioisotopes: - (continued)

SHIPMENTS OF CYCLOTRON-PROCESSED RADIOISOTOPES

Material	No. Shipments May, 1951	No. Millicuries May, 1951	No. Millicuries To Date
Be 7	0	0	201.073
Na 22	7	4.49	46.363
Mn 52	0	0	9.991
Co 57	0	0	2.0
Fe 59	2	.6 mc and 1 unit	2.1 mc and 2 units
Zn 65	5	25 mc and 3 units	32 mc and 3 units
Mn 54	1	0.8	2.72
Fe 55-59	18	60.0	61.0
As 73	0	0	0.650
Sr 85	0	0	6.0

IV. Activation Analyses:

The Shell Development Company of Emeryville, California, has indicated interest in having several hundred samples of organic vegetable matter analyzed for traces of chlorine by means of activation analysis. The Chemistry Division has indicated that this will be possible and requested a few samples to develop the procedure for analysis.

M. E. Ramsey

M. E. Ramsey, Superintendent
Operations Division

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V. S-F Material Control:

1. During the month three express cars were received from Hanford. The first car received on May 2, 1951, contained twenty (20) four-inch and nine (9) eight-inch irradiated slugs for Sr^{90} extraction. One receptacle slug (irradiated) for F. M. Tench and several smaller containers loaded with non-SF materials for radioisotope separation were in the car. The second car was received on May 13, 1951, and contained seventy-six (76) four-inch irradiated slugs for the RaLa process and one hundred and forty (140) four-inch irradiated slugs for use in connection with Pilot Plant development and demonstration runs utilizing the Purex process. The third car was received May 27, 1951, and contained thirty-two (32) eight-inch and forty (40) four-inch irradiated slugs for Sr^{90} extraction and one smaller pot containing ceramic materials for Dr. Billington.

2. A total of 234 kilograms of thorium metal in the form of billets was received from Ames Laboratories, Iowa State College. The thorium will be used in general research by the Metallurgy Division.

3. Eleven tons of normal uranium rods were shipped to Y-12 for use in fabricating Al-Si bonded slugs for the 3001 pile.

4. One trailer load of SF waste solutions was received from Argonne for disposal into the waste storage tanks. Twelve of the drums contained solvents and, therefore, were consigned to the burial ground.

V. S-F Material Control: - (continued)

5. The SF Office continued its program of surveying material balance areas within the Laboratory. During the month five persons possessing SF material were visited and their material was inspected and weighed where feasible. No apparent discrepancies were encountered.

6. Records of three analytical laboratories were audited. Results of the audit disclosed that all records were in good order and proper accounting had been made for samples.

7. One hundred and eighty-six kilograms of thorium scrap were shipped to United Lead Company for recovery.

8. During May there were twenty-nine receipts and seventeen outgoing shipments, compared with sixteen receipts and eighteen shipments last month.

9. Following is a summary of receipts and shipments of SF material for the month of May, 1951:

RECEIPTS

From	Material	Content
Argonne National Laboratory	Depleted U (waste)	1,720.00 gm
Argonne National Laboratory	Depleted U (slugs)	10,900.00 gm
Argonne National Laboratory	Plutonium (waste)	0.31 gm
Argonne National Laboratory	Plutonium (slugs)	4.95 gm
Battelle Memorial Institute	Thorium metal	50,570.00 gm
Brookhaven National Laboratory	Normal U (BNL-slugs)	2,333.00 gm
C&CCC, K-25 Area	Normal U (UF_6)	1,412.00 gm
C&CCC, K-25 Area	Normal U (UO_3)	379.00 gm
C&CCC, K-25 Area	Normal U (UF_6)	2,858.00 gm
C&CCC, K-25 Area	Normal U (UF_6)	15,581.00 gm

V. S-F Material Control: - (continued)

9. Summary of receipts and shipments for May, 1951:

RECEIPTS - (continued)

From	Material	Content
C&CCC, Y-12 Area	Normal U (tubes)	560.00 gm
C&CCC, Y-12 Area	Normal U (UO_3)	44.20 gm
C&CCC, Y-12 Area	Thorium (tubes)	168.18 gm
C&CCC, Y-12 Area	Normal uranium (UNH)	111,624.80 gm
C&CCC, Y-12 Area	U-236 (U_3O_8)	248.20 mg
C&CCC, Y-12 Area	U-234 (U_3O_8)	92.80 mg
C&CCC, Y-12 Area	U-233	12.54 mg
C&CCC, Y-12 Area	Normal U (UO_2SO_4)	2,818.10 gm
General Electric Co., HGE	Depleted U (slugs)	67,363.00 gm
General Electric Co., HGE	Plutonium (slugs)	34.00 gm
General Electric Co., HGE	Depleted U (slugs)	1,655.60 gm
General Electric Co., HGE	Enriched uranium-alloy	0.33 gm
General Electric Co., HGE	Depleted U (slugs)	135,134.00 gm
General Electric Co., HGE	Plutonium (slugs)	34.00 gm
General Electric Co., HGE	Depleted U (slugs)	248,930.00 gm
General Electric Co., HGE	Plutonium (slugs)	100.00 gm
General Electric Co., HGE	Depleted U (slugs)	184,377.00 gm
General Electric Co., HGE	Plutonium (slugs)	88.00 gm
Iowa State College	Thorium metal - billets	35,240.00 gm
Iowa State College	Thorium metal - billets	41,280.00 gm
Iowa State College	Thorium metal - billets	34,950.00 gm
Iowa State College	Thorium metal - billets	38,330.00 gm
Iowa State College	Thorium metal - billets	41,780.00 gm
Iowa State College	Thorium metal - billets	42,250.00 gm
Iowa State College	Thorium metal - billets	42,530.00 gm
Los Alamos Scientific Lab.	Pu (nitrate solution)	52.69 gm
Eimer and Amend (Purchase)	Th Cl_4	231.33 gm

V. S-F Material Control: - (continued)

9. Summary of receipts and shipments for May, 1951:

To	Material	Content	
Argonne National Laboratory	U-233	1.00	gm
Brookhaven National Laboratory	Normal uranium (chips)	250.00	gm
C&CCC, K-25 Area	Depleted U (metal)	0.254	gm
C&CCC, K-25 Area	Normal uranium (UF_6)	1,159.00	gm
C&CCC, Y-12 Area	Normal uranium (rods)	10,467,224.27	gm
C&CCC, Y-12 Area	Normal uranium (rods)	2,100.00	gm
C&CCC, Y-12 Area	Thorium (rods)	150.00	gm
C&CCC, Y-12 Area	Normal uranium (alloy)	114.00	gm
C&CCC, Y-12 Area	Enriched U (U_3O_8)	0.124	gm
C&CCC, Y-12 Area	Depleted U (U_3O_8)	0.509	gm
C&CCC, Y-12 Area	U-236 (U_3O_8)	248.20	mg
C&CCC, Y-12 Area	Enriched U (alloy)	0.13	gm
Iowa State College	Thorium (ThD_2)	124.00	gm
Mallinckrodt Chemical Works	Normal U (solutions)	33,000.00	gm
United Lead Company	Th metal (scrap)	185,950.00	gm
United Lead Company	Normal U (scrap)	4,530.00	gm
USAEC, NYOO	Th metal (turnings)	2,440.00	gm
New Brunswick Laboratory	Normal U (solutions)	900.00	gm
University of Rochester	Pu (solutions)	0.00113	gm