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OPERATIONS DIVISION

MONTHLY REPORT
FOR
MONTH ENDING JUNE 30, 1949

BY

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OAK RIDGE NATIONAL LABORATORY

OPERATED BY
CARBIDE AND CARBON CHEMICALS CORPORATION
FOR THE
ATOMIC ENERGY COMMISSION
POST OFFICE BOX P
OAK RIDGE, TENNESSEE

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OPERATIONS DIVISION

MONTHLY REPORT

for

Month Ending June 30, 1949

by

M. E. Ramsey
E. J. Witkowski
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DATE ISSUED
JUL 27 1949

O A K R I D G E N A T I O N A L L A B O R A T O R Y

operated by
Carbide and Carbon Chemicals Corporation
for the
Atomic Energy Commission
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SUMMARY

1. Lost pile operating time averaged 10.3% as compared to 11.9% for the last month. (Page 4.)
2. The bearings on the No. 2 fan were replaced during the month. (Page 5.)
3. Minor difficulties in P^{32} production caused delay in several shipments. Development work indicates that this process will be greatly improved as soon as new equipment is available in the Isotope Area. (Pages 7 and 8.)
4. The chemical waste evaporator was placed in service this month. A 50% reduction in activity discharged to the Settling Basin resulted. (Page 13.)
5. RaLa Run No. 34 is scheduled to start July 9, 1949, with shipment about July 17, 1949. (Page 16.)
6. During June, 447 shipments of radioactive materials were made to bring the total since August, 1946, to 8,482. (Page 17.)
7. Effective July 1, 1949, the millicurie used for shipping I^{131} was changed to an absolute value. The millicurie formerly used was 1.75 times this new figure. (Page 17.)
8. The Radioisotope Processing Area is expected to be completed by September 1, 1949. The Office Building was occupied on June 16, 1949. (Page 19.)

A. PILE DEPARTMENT

I. Operating Data:

	JUNE 1949	MAY 1949	YEAR-TO-DATE 1949
Total Accumulated KWH	2,304,835	2,476,540	15,128,865
Average KW/operating hour	3567.31	3779.06	3840.73
Average KW/24-hour day	3201.16	3328.68	3482.70
Percent Lost Time	10.3%	11.9%	9.3%
Approx. Excess Pile Reactivity	80-90 inhours	80-90 inhours	
Slugs Charged	83	101	2056
Slugs Discharged	33	149	2004
Product Made (grams)	84.12	90.39	525.15
Product Discharged (grams)	0.22	1.84	142.76

II. Pile Operation:

The pile-down time averaged 10.3% compared to 9.3% for the year-to-date. The slight increase in pile-down time was due principally to lost time in connection with the installation of a new Safety rod in Hole 8. The installation was made somewhat complicated due to the vertical liner through the pile shielding being out of line with the channel in the graphite.

The new Safety rod was built and installed to determine whether replacement of the four older-type Safety rods with the new and larger type would give a poison effect equivalent to the total of the present Safety and Shim rods. If an equivalent or greater poison effect is obtained, it will be feasible to remove the two Shim rods on the north side of the pile and built better balconies, increasing the number of available holes and space for research work.

No ruptured nor swelled slugs were detected during the month.

The fuel assembly was installed during this month in Hole 11 for evaluation by personnel from the Argonne National Laboratory. Some difficulty was experienced early in the month because of the use of a faulty lead shield. Repairs have been made and the experiment is progressing satisfactorily.

The excess pile reactivity has remained constant at eighty to ninety inhours throughout the month.

III. Filter House:

The following table compares the pressure drops of last month and this month with that experienced immediately after replacement of filters:

	F. G. #50 GLASS WOOL FILTERS		C.W.S. #6 PAPER		ACROSS HOUSE	
Date	Inches w.g.	% Increase	Inches w.g.	% Increase	Inches w.g.	% Increase
Clean filters	1.1	--	1.0	--	3.3	--
5-31-49	3.5	+227%	1.7	+70%	6.4	+91%
6-30-49	3.3	- 6%	1.8	+ 6%	6.3	- 2%

Filter House operation was normal throughout the month.

IV. Fan Operation:

The bearings on No. 2 fan were replaced on June 15, 1949, due to the failure of the south bearing race. This set of bearings was in service fourteen months. This is the best service that has ever been given by a set of fan bearings on these fans.

Even though fan-bearing performance is still not satisfactory, our recent experience is somewhat improved over the initial operation of the bearings. The first ten sets of bearings gave an average life of one and one-fourth months, whereas the last ten sets of bearings have given an average life of slightly over four months.

Fan House operation was normal except for the bearing failure on No. 2 fan.

V. Radioisotopes:

The following table is a comparison of the radioisotope and research samples charged into the pile during June, 1949, with those handled in May, 1949:

V. Radioisotopes: (Continued)

	JUNE, 1949		MAY, 1949	
	Research	Radioisotopes	Research	Radioisotopes
Stringers 13, 14, and 16	90	83	13	104
Hole 22 (Pneumatic Tube)	64	2	77	1
All Other Holes	8	16	5	22
TOTAL BY GROUPS	162	101	95	127
TOTAL FOR MONTH	263		222	

At the end of June, 1949, there were 389 cans of target material in Stringers 13, 14, and 16, compared to 360 cans of target material in these stringers at the end of May, 1949.

B. CHEMICAL SEPARATIONS AND ISOTOPE DEVELOPMENT DEPARTMENTS

I. Radioisotopes:

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

Twenty-three uranium slugs were processed and approximately 10,400 millicuries were shipped. All products were within specifications.

The lower than usual yields are a result of a high loss from nitrate contamination in the first run, the cause of which is still unknown.

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

Eighteen, 2000-gram cans of irradiated sulfur were processed and approximately 5,000 millicuries were shipped.

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

The lower yields this month are a result of the following:

a. Losses due to activity hold-up by large amounts of silica in the evaporator.

b. Losses in repurification of some products which showed a precipitate at a pH7.

c. Some Losses in the extraction step.

d. A short irradiation time for some of the cans.

The new hood containing the two new evaporators mentioned in last month's report was put into operation.

Phosphorus Development Work

Work on the cation-anion resin process for purification of P^{32} continued with investigation of the sizes of columns and weight of resin required for full-scale runs. Tests indicate that P^{32} losses on the cation column (Dowex 50) will run less than 1% if the total iron content of the extraction liquor is kept below 50 mg. This condition should be easily met with the glass-lined extractor. One gram of Dowex A-1 or A-2 anion resin will handle 1-2 milliequivalents of anion, so it is expected that approximately 100 grams of resin will be required for the full-scale equipment. The anion column section will be divided into two parts, one large column to remove the bulk of the sulphate and phosphate, and a small one to complete the purification of the P^{32} band eluted off of the large column. The P^{32} band will be followed by means of a slotted ionization chamber, similar to the way bands are followed in fission product separations. It will be necessary for the anion column system to be completely closed and free from CO_2, because sodium hydroxide is used for

2. Phosphorus Development Work - (Continued)

the regenerating solution with these resins and any carbonate taken up results in the discharge of CO_2 gas in the column during the acid cycle.

An ORNL-type welded slug containing 100 grams of sulfur was exposed to fast neutrons for two weeks between two uranium slugs in a regular channel. This slug has been discharged and examined in the canal. It looks normal; no swellings or other malformations were noted. Full data on this slug will be reported later. Four more slugs of this same type are ready for insertion into the pile. So far, welding slugs well enough to pass the leak tests has proved very difficult; rejects are running about 60%. Various welding techniques will be tried until a good one is found.

Several production runs in Cell 5 have been followed closely to determine the source of occasional traces of cations in the product. Several places in the procedure were found where the efficiency of cation removal could be improved.

3. Carbon (C^{14} - 5100y)

No runs were made on the $Ca(NO_3)_2$ process this month.

C^{14} Development Work (Be_3N_2 Process)

A process was developed for preparing pure $BeCl_3$ from our Be_3N_2-C^{14} process waste. A quantity of this material, containing Be^{10}, is needed by the Physics Division, to be processed by Y-12 to produce enriched Be^{10}. The process used is as follows: $BeSO_4(NH_4)_2SO_4$, the dry waste material obtained from our process, is converted to BeO by baking. The BeO is treated with carbon and chlorine gas at 450°C., the $BeCl_2$ volatized and condensed in a closed system. $BeCl_2$ is an extremely hygroscopic

3. C^{14} Development Work (Be_3N_2 Process) - (Continued)

material. $BeCl_2$ is of interest to us also in that it may be possible to prepare the nitride from it without converting beryllium back to metallic form. The balance of the preparations of $BeCl_2$ will be done by Y-12 in their large facilities; we will furnish the BeO containing Be^{10}.

Work continued on the H_2O_2 process for production of C^{14} from Be_3N_2. Results have been favorable and indications are that this method will be used in place of the chromic acid procedure, thus simplifying design of our ten-slug plant in the new Isotope Area.

Inventory of C^{14} resulting from development work is as follows: Less than 3% isotopic ratio, 70.3 mc; 3% to 6%, 3.2 mc; 6% to 9%, 39.2 mc; 10% and over, 33.4mc; total, 207.19 mc.

4. Sulfur (S^{35} - 87d)

A routine preparation of two curies of BaS^{35} was made this month. The analysis is not completed.

5. Fission Products

A sampler and new equipment for removing products from the cell were installed this month. The sampler was installed in order to obtain rough preliminary analyses of the various fractions as they are eluted from the columns. The new handling equipment has reduced exposure to radiation.

Runs SS-15 and SS-16 were in progress during the month. SS-15 was made up from one and a half, sixty-day slugs and was well along in process when a spacial order for Ba^{140} was received requiring immediate shipment. The lower fractions, Y to Sr, were dropped out rapidly with 3.5 pH citrate and the Ba^{140}

5. Fission Products - (Continued)

removed at pH 7.0. Three hundred millicuries of pure Ba^{140} were shipped; the other fractions will be removed on auxiliary columns.

Run SS-16 was made up from three-year slugs, cooled one and a half years. This run is bring made particularly to recover Cs^{137}.

a. Zr^{95}-Cb^{95} (Zr^{95}-65d, Cb^{95}-35d)

Approximately 10 mc of purified Cb^{95} was produced by the TTA process. The product is slightly different than usual in that this preparation is stored in 0.01 M HCl instead of oxalic acid solution. Glass storage bottles treated with dimethyl silicone vapor can apparently be used successfully to store uncomplexed Zr-Cb without undue adsorption losses on the glass.

b. Yttrium (Y^{91} - 57d)

None produced this month.

c. Rare Earths (Nd^{147}-11d, 61^{147}-3.7y, Pr^{143}-14d)

None produced this month.

d. Cerium ($Ce^{141-144}$ - 28d,280d)

Two curies of old cerium (Ce^{144}) were obtained from the Chemistry Division and are being separated from Pu.

6. Ruthenium (Ru^{106} - 1y)

No concentrations were made.

Ruthenium Development Work

A Ru^{106} test plaque was made according to a customer's specifications and shipped. Approximately five microcuries of Ru^{106} were plated onto a gold plaque 1" in diameter. Inactive ruthenium was added to the plating preparation so that the Ru metal deposit weighed 0.00012 g.; this was covered with

6. Ruthenium Development Work - (Continued)

a thin gold plate weighing 0.0010 g. This makes the total absorber about 0.2 mg/cm^2, which will not absorb a significant amount of the 4 MEV beta radiation from the rhodium daughter of Ru^{106}. This plaque was shipped in a slotted Lucite block.

7. Calcium (Ca^{45} - 180d)

No Ca^{45} was produced this month.

8. Strontium (Sr^{89-90} - 55d, 30y)

Processing of the fifteen-curie batch of Sr^{90}, referred to in the last report, has been set aside indefinitely, since existing orders for Sr^{90} can be filled from material made by the Chemical Separations Department. Manpower being used on this operation is needed on other problems at this time.

9. Iron (Fe^{55-59} - 4y, 44d)

The analysis of the iron preparation reported last month is as follows:

Total Activity	-	60.5 mc Fe^{59}, 70.0 mc Fe^{55}
Concentration	-	Fe^{59} - 0.252 mc/ml
Concentration	-	Fe^{55} - 0.279 mc/ml
Concentration	-	Total Fe - 53 mg/ml
Specific Activity	-	Fe^{59} - 4.8 mc/g. Fe
Specific Activity	-	Fe^{55} - 5.3 mc/g. Fe
Acidity	-	0.484 N in HCl

A sample, enriched (Y-12) Fe^{58}, which had been irradiated at Hanford was processed. The analysis is as follows:

Total Activity	-	43.2 mc Fe^{59}, 1.91 mc Fe^{55}
Concentration	-	Fe^{59} - 0.72 mc/ml
Concentration	-	Fe^{55} - 0.03 mc/ml
Concentration	-	Total Fe - 0.8 mg/ml
Specific Activity	-	Fe^{59} - 900 mc/g. Fe
Specific Activity	-	Fe^{55} - 40 mc/g. Fe
Percent Fe^{55}	-	4.27%

10. Zinc (Zn^{65} - 250d)

A Hanford sample was processed to give a product with the following analysis:

Total Activity	-	2,570 mc
Concentration, Zn^{65}	-	25.7 mc/ml
Concentration	-	Total Zn, 58.3 mg/ml
Specific Activity	-	440.8 mc Zn^{65}/g. Zn
Free Acid	-	0.033 N HCl

11. Miscellaneous

a. Two encapsulated, calibrated Co needles were prepared for a customer. The needles were placed in stainless steel sheaths and sealed with paraffin for easy removal. These samples were calibrated against Bureau of Standards needles, giving the value 1.037 mc/cm.

b. A cerium source (Ce^{144}) is being prepared for a customer who submitted a special gold-plated source holder for this purpose. A pin-hole was discovered in the gold plate, delaying the preparation until a new gold plate can be put on.

c. The separation of Be^{7} from a lithium cyclotron target reported last month yielded one millicurie of 99.9% pure Be^{7}. The material has been shipped.

d. Separation and analytical work has been completed on the old RaLa sample to determine the long-life radioactive contaminants. The data are now being assembled and calculations made. A memo-report will be issued on this subject.

II. Tank Farm and Burial Ground:

1. Wastes Discharged to the White Oak Creek

a. Approximately 63.45 curies of beta activity were discharged from the Settling Basin this month. This was an average of 2.11 curies per day or only about one half of the quantity discharged last month. This was due to the chemical waste evaporator being put into service this month, which concentrates the active solutions for storage and thus eliminates excessive discharge of activity to the Settling Basin.

b. On June 2, 1949, the first full-scale run, using hot waste from W-5, was started in the chemical waste evaporator. To date, ten runs have been made with occasional trouble being experienced by the concentrate foaming over from the evaporator to the condensate catch tank. In order to minimize these foam-overs, Dow-Corning Anti-Foam is being used.

One mechanical failure has occurred which caused a loss of approximately eight hours' time. The gate in the valve from the condensate tank to W-5 stuck and had to be replaced. An acid wash from the feed tank to the evaporator was enough to decontaminate the equipment so that this work could be done.

Beginning next month, the results of the evaporator operation will be tabulated to show the amount of waste evaporated, the volume reduction, and the approximate decontamination factor.

c. To make room for the evaporator concentrate, 102,000 gallons of waste from W-6 was jetted from W-6 to the East Pond. This contained about 175 curies of beta activity.

d. A survey is being made to determine the feasibility of locating a new Burial Ground at a point, near the White Oak Creek, which is considered more desirable from a geological standpoint. Preliminary estimates indicate that the cost of such a project would range between $10,000 and $20,000. Numerous core drillings have been made over an area of about four to five acres and only two holes have shown rock closer than fifteen feet from the surface. This would indicate the soil is suitable for digging large holes.

e. The following table shows the discharge of activity to the White Oak Creek:

Discharged From	Gallons	Curies
Settling Basin	22,577,000	63.45
Retention Pond	274,000	0.2

2. Waste Tank Inventory

CHEMICAL WASTE STORAGE

Tanks	Gallons Capacity	Gallons In	Gallons Out	Discharged To	Free Space
W-5	170,000	--	113,890	Evaporator	62,400
HOT PILOT PLANT STORAGE					
W-3	41,300	5,624	16,576	Evaporator	14,800
EVAPORATOR CONDENSATE					
W-6	170,000	4,200	--	--	108,000
METAL WASTE					
W-4,7, 8,9,10	713,000	3,272	--	--	93,216

3. Special Wastes

a. A total of 511.21 kg of uranium was received into the metal storage system this month. Of this, the Hot Pilot Plant transferred 315.4 kg; the Technical Division, Section I, 165.3 kg; I^{131} process, 30.42 kg; Technical Division, Section IV, .09 kg.

b. About 17.64 kg of uranium were transferred to the Technical Division, Section I, from W-10 tank for metal recovery studies.

c. Two shipments of alpha-contaminated material from Dayton.

d. Two shipments of contaminated trash from K-25 were buried.

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

RaLa Run No. 34 is scheduled to start July 9, 1949.

The two variacs, burned out during RaLa Run #33, have been repaired and a new glassware reactor has been placed in the cubicles in preparation for Run #34.

Investigation disclosed the A4-205 off-gas line condensate pit as a source of air contamination during RaLa Run #33. A small blower has been installed which will vent the air from this pit to above the 706-D roof level. Its effect will be determined during RaLa Run #34.

The A-16 off-gas lines and filter box are being relocated to provide room for the concrete pad which is adjacent to the new 900 Area off-gas stack. This work should be completed before July 9, 1949.

C. ISOTOPE CONTROL DEPARTMENT

I. General:

There were 447 isotope shipments during the month of June compared with 511 during May.

During most of the month there was a shortage of P^{32} due to processing difficulties.

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

	MAY 1949	JUNE 1949	TOTAL August, 1946, to June, 1949, Inc.
Separated Material 706-D Area	382	332	6,539
Unseparated Material 100 Area	129	115	1,943
	511	447	8,482

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

	MAY	JUNE
Non-Project	418	367
Project	64	54
Foreign	29	26
	511	447

II. Phosphorus 32:

The University of California reported a precipitate in one shipment of P^{32} during the month and further work is in progress to determine the cause.

III. Iodine 131:

A series of investigations at ORNL and at the Bureau of Standards during the past year indicated that the quantity of I^{131} which was being shipped as a millicurie was 1.75 times too great. Effective July 1, 1949, the I^{131} content has been corrected and the price adjusted accordingly.

IV. Handling Charges:

Effective July 1, 1949, all handling charges were reduced to $10.00 at the request of the Atomic Energy Commission. This will considerably simplify pricing of isotope shipments and will not result in an appreciable decrease in revenue.

V. Ruthenium 106:

A considerable demand for ruthenium 106 plated on metal appears to lie in thickness gages. A number of these gages have been prepared by Tracerlab and other isotope processing concerns using strontium 90 fused on ceramic surfaces. It is believed that ruthenium plated on metal will prove even more satisfactory for such an application because self-absorption can be better controlled and also because the rhodium daughter of ruthenium has a higher energy beta ray than the Sr^{90}-Y^{90}. Ruthenium sources plated on metal also appear to have promising applications in medicine as sources of beta radiation. Among the uses suggested to date are radiation of skin and eye tumors and radiation of the inside of the stomach to reduce acid secretion and thus encourage healing of ulcers.

VI. Antimony-Beryllium Neutron Sources:

The Atomic Energy Commission has approved the following selling prices for Sb-Be neutron sources:

Antimony-Beryllium Source	$44.00
Service Irradiation of the Source	43.00/month
Returnable Deposit on Container	400.00

VII. Radioisotope Processing Area:

In the Isotope Processing Area work continued on all buildings. The office building was completed and occupied on June 16, 1949. Work in the analytical building included completion of the roof, tile walls, acid-proof floor and walls of the decontamination room, the concrete storage barricade, and approximately seventy percent of the lead isotope loading barricade; also, work continued on installation of the service piping, electrical wiring, and exhaust ducts. In the process buildings work continued on the service piping, exhaust ducts, electrical wiring, and the interior aluminum walls; installation of the lead barricades was started in Buildings D and E. The fog fire-protection system was installed in the column building and tested. The interiors of the decontamination and service buildings were painted, and painting was started in other process buildings.

The concrete roadway was poured west of the analytical building and D and E process buildings, and north of the analytical and office buildings. In the stack area installation of the semi-hot drains, the hot drains, and the hot off-gas lines was started. Also, pads were poured for the other two blowers, and installation of one of the blowers started.

L. B. Emlet, Director
Operations Division

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VIII. Source and Fissionable Material Accountability:

A complete audit of several individual accounts was conducted by Mr. D. George, Washington SF Accountability Office, and Mr. H. Kilburn of the Oak Ridge Operations Office. Accounts checked in detail were: Drs. S. Siegel, W. Johnson, L. Roberts, and D. Billington.

The Atomic Energy Commission quarterly accountability survey unit was made by Dr. C. Luke, Syracuse University, accompanied by T. Haycock and P. Selak of Oak Ridge Operations. A field trip covered the following divisions: Physics, Chemistry, Technical, Metallurgy, and Operations.

During the month a total of 69.5 kilograms of normal uranium was discarded because of the inadequate Tank Farm distribution system.

Two people were added to the department for assistance in devising a sample control system for accountability of all fissionable sample transfers.

The Accountability Office was moved to Room 103, Building 105.

Following is a summary of shipments and receipts of SF Materials for the month of June, 1949:

RECEIPTS

Received From	Material	Content
Argonne National Laboratory	Waste Solution	229.00 mg Pu
" " "	12 Zr Class U/Zr Plates	640.14 gm
" " "	Waste Solution	107.00 gm Normal
		12.00 mg Pu
" " "	Enriched U308 on Platinum	1.11 mg
" " "	Waste Solution	395.00 mg Pu
" " "	Waste Solution	17.23 kg Normal
		67.00 mg Pu
Carbide & Carbon Chem. Corp.	Uranium Metal Waste Solution	16,200.00 gm Normal
		90.00 mg Pu
C&CCC, Y-12 Area	Normal Uranium Rods	116,700.00 gm
" " "	Normal Uranium Rods	335.50 gm
" " "	Depleted Uranium	4.90 gm
" " "	Uranyl Nitrate Crystals	No weights available
General Electric Company	Standard Redox Solution	1.55 lbs.

SHIPMENTS

Shipped To	Material	Content
Argonne National Lab.	Pu Solution 1.3M $Al(NO_3)_3$	8.88 gm Pu
C&CCC, K-25 Area	UNH S	2.15 kg
" " "	UAP Cake, Normal Uranium	54.50 kg
" " "	1 Drum UAP Cake, Normal Uranium	87.50 kg
C&CCC, Y-12 Area	U_3O_8 Enriched Uranium (90 to 95%) (for analysis and assay)	0.49 gm
" " "	Al-U Alloy Enriched Uranium (90 to 95%) (for analysis)	2.445 gm
" " "	Al-U Alloy Enriched Uranium (38.0%) (for analysis)	0.70 gm
" " "	U-Al-Alloy-Depleted (for recovery)	2.5483 gm
" " "	U-Al-Alloy Enriched Uranium(for recovery)	0.5023 gm
" " "	U-Al-Alloy Enriched Uranium (47.2%) (for recovery)	1.25 gm
" " "	U-Al-Alloy Enriched Uranium (90 to 95%) (for recovery)	0.5079 gm
" " "	U_3O_8 Enriched (90 to 95%)(for salvage)	0.6500 gm
" " "	Uranyl Nitrate (85.4%) (for analysis and assay)	0.561 gm
" " "	Enriched Uranium Compounds (90 to 95%) (for analysis and assay)	2.496 gm
" " "	Enriched Uranium Compounds (85 to 90%) (for salvage)	0.550 gm
" " "	U-Al-Alloy Solutions (90 to 95%) (for salvage)	2.9189 gm
" " "	Black Oxide U_3O_8 (90 to 95%) (for salvage)	0.4019 gm
" " "	Waste Solution (94.8%)(for salvage)	0.2800 gm
" " "	Waste from UO_3 Sample(83.5%)(for salvage)	0.0672 gm
" " "	2 Pieces U-Al-Alloy(94.8%)(for salvage)	1.7300 gm
" " "	UO_3 (10.3%)	36.5400 gm
" " "	Foil Trimmings (93.3%)(for salvage)	0.4283 gm
" " "	12 Enriched Uranium Slugs (93.5%)	135.5000 gm
North Amer. Aviation Inc.	Normal Uranium Al-Foils	4.15 gm
Fairchild Eng.& Airplane Corporation	10 Pt. plated and 3 Pt. Strips containing Pu Alpha Source	3.00 mg Pu
" " "	Normal Uranium	250.57 gm
U.S. Naval Supply DepotNY	10 ml Redox Dissolver Solution	4.80 gm Normal
" " " "	5 ml Redox 1 AW Waste Stream	Nil
" " " "	100 ml Redox Uranium Solution in Hexone	7.50 gm
" " " "	200 ml UNH Solution Redox 2nd Cycle Uranium Product	29.00 gm
" " " "	10 ml Redox Solution	Nil
" " " "	100 ml Redox ICU Solution	14.80 gm
" " " "	200 ml Redox Solution(Pu) as Nitrate	52.60 mg Pu
" " " "	200 ml Redox Pu Solution as Nitrate	62.80 mg Pu

[redacted]

SHIPMENTS - (Continued)

Shipped To	Material	Content
US Naval Supply Depot NY	25 ml Uranium & Pu Solution in Hexone	2.8 gm Normal 0.8 mg Pu
" " " "	10 ml Redox 1st Cycle Feed Solution	4.8 gm Normal 1.3 mg Pu
" " " "	3 liters Redox 2nd Cycle Waste Solu.	Nil
" " " "	3 liters Redox UNH Solution (1st Cycle U Product)	459.00 gm
Westinghouse Elec. Corp.	Normal Uranium Be Rods	.03 kg

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