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Z-PLANT WEEKLY REPORT
TASK I-II & RECOVERY OPERATIONS
JANUARY 1, 1964, through DECEMBER 31, 1964

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Z-PLANT WEEKLY REPORT

TASK I-II & RECOVERY OPERATIONS

JANUARY 1, 1964, through DECEMBER 31, 1964

By:

R. L. WALSER & R. Y. LYON

PLUTONIUM PROCESS ENGINEERING
RESEARCH AND ENGINEERING OPERATION
CHEMICAL PROCESSING DEPARTMENT

January 2, 1964

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January 13, 1964

Z-PLANT WEEKLY REPORT

January 1 thru January 12, 1964

TASK I - II

Two hundred eighty (280) kgs of plutonium were processed with an aqueous recycle of 3.58 percent. The average on-line rate was 1582 grams of plutonium per hour, with a mechanical efficiency of 89 percent. A total of 10,016 grams of plutonium was recovered from the ion exchange facility at an average concentration of 40.6 grams of plutonium per liter.

Seventy grams of plutonium were discarded to waste at an average concentration of 0.005 gram of plutonium per liter. Recovery of plutonium feed to ion exchange facility amounted to 99.3 percent.

Two buttons failed to meet product specifications due to low density. The average density of the acceptable buttons was 19.38 g/cc. The total impurities, as averaged on 58 of 134 buttons produced, was 1507 ppm. Carbon averaged 304 ppm; Fe, Cr, and Ni averaged 226 ppm; Al, Cu, Si, and Sn averaged 18 ppm; and Mg averaged 834 ppm. The average yield was 98.6 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 0.56 percent of charge.

RECOVERY OPERATIONS

Oxide Dissolution

Approximately 34 kgs of plutonium were recovered in the glass dissolvers during the week ending 1-5-64. A water leak from a loose condenser drain line resulted in the transfer of approximately 20 liters of solution, containing a total of 0.6 gram of plutonium, to the sump from room 149 on 1-3-64. On the same day, a condenser broke in room 161, filling the dissolver with solution. The excess solution was boiled off, and the run continued without further complications. Repair of the equipment was completed quickly, and the dissolvers were placed back in operation.

A total of 19.9 kgs of plutonium was recovered from the glass dissolvers during the week ending 1-12-64. An overbatch incident occurred in the room 161 pots 2 and 3 on 1-6-64. Poor recoveries from normal charges, followed by failure to observe the light color of the solutions upon transfer, and failure to accurately estimate the heel remaining, resulted

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in recharging and overbatching of the dissolvers. A total of 694 and 658 grams was recovered from each dissolver vs the batch limit of 500 grams per dissolver. As a result of this and previous incidents of this type, all specialists have been given written instructions to wait for the analyses of previous runs and to personally observe the amount of heel left in each dissolver before ordering recharging of the dissolvers.

Data for the runs involved are listed below:

	<u>Charge</u>	<u>Recovery</u>
#2	337	8
	376	432
	<u>0</u>	<u>262</u>
	713	702
#3	378	29
	384	514
	<u>0</u>	<u>154</u>
	762	697

Hood 42

One run was made in both dissolvers in hood 42 on 1-12-64. Approximately 1170 grams were charged to each dissolver, with the recovery of only 59 grams from M-1 and 859 grams from M-2. Investigation revealed failure of a relay in the electrical system for the M-1 heater. This facility has resumed full scale operation to dissolve stabilized material for further purification in the Purex Plant.

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Two bottles of ion exchange resin were leached in this facility during the week ending 1-5-64. Two beakers of material from the floor of hood 7-C were also processed during this period.

Processing of ion exchange resin prior to disposal continued during the week ending 1-12-64. Four 4-liter bottles of resin and a beaker of material from HC-17P (pickling hood) were processed during this week.

Incinerator

Operation of the incinerator was delayed until 1-8-64 by a number of problems. A burned-out scrubber off-gas heater was replaced on 1-3-64. The rubber conveyor belt damaged by the fire was replaced on 1-6-64, and the rubber bellows between the chopper and the feed hopper was replaced on 1-8-64.

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Materials from four boxes of waste and 18 liters of R & B floor sludge were processed through the incinerator in approximately 21 hours of burning. It became necessary to reduce the burning rate during the period due to smoke issuing from the inlet to the primary chamber. It appears that the secondary chamber outlet to the cyclones is restricted sufficiently to limit the off-gas flow. An investigation will be made. Sixteen cans of ash resulted from burning operations.

Six boxes of waste previously removed from the sorting hood were resorted in an effort to confirm high plutonium contents. As a result of this resorting and normal sorting of four boxes, 11 boxes of waste were removed and discarded. The leach hood was operated during this period, with three batches of solution loaded in PR cans. The rubber conveyor belt was cut up and cleaned in the leach hood before being discarded.

The overall material balance for the operating period was as follows:

<u>Input</u>		<u>Output</u>	
6 waste boxes:	315 g Pu	11 waste boxes:	154 g Pu
4 boxes incinerable waste:	274 g Pu	3 leach solution batches:	141 g Pu
18 R & B sludge packages:	996 g Pu	1 scrubber solution batch:	4 g Pu
		16 ash cans:	1058 g Pu
TOTAL:	1585 g Pu		
		TOTAL:	1357 g Pu

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January 20, 1964

Z-PLANT WEEKLY REPORT

TASK I-II

One hundred seventeen kgs of plutonium were processed with an aqueous recycle of 2.9 percent. The average on-line rate was 1777 grams of plutonium per hour, with a mechanical efficiency of 72 percent.

A total of 3344 grams of plutonium was eluted from the ion exchange facility at an average concentration of 28.1 grams of plutonium per liter. Twenty-six grams of plutonium were discarded to waste at an average concentration of 0.004 gram of plutonium per liter. Recovery of the plutonium feed to ion exchange facility amounted to 99.2 percent.

Three buttons failed to meet density specifications. The average density of the acceptable buttons was 19.40 g/cc. Total impurities, as averaged on 25 of 53 buttons produced, was 1972 ppm. Carbon averaged 192 ppm; Fe, Cr, and Ni averaged 502 ppm; Al, Cu, Si, and Sn averaged 12 ppm; and Mg averaged 1033 ppm. The average yield was 98.6 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 1.4 percent of charge.

RECOVERY OPERATIONS

Oxide Dissolution

Operation of both the glass dissolvers and the hood 42 teflon-lined dissolvers continued throughout the week. A total of 32.1 kgs of plutonium was recovered in the glass dissolvers. Of this total, approximately 10 kgs were recovered from non-stabilized material and was sent directly to the button line. The remaining 21 kgs recovered from stabilized material were sent to the Purex Plant for further processing.

Hood 42 produced a total of 21.5 kgs during the week, which was also sent to Purex. An average of 630 grams of plutonium per run was recovered from the M-1 dissolver during 11 normal and 6 clean-out runs, for a total of 10.7 kgs. A total of 10.8 kgs of plutonium was recovered in M-2 during 10 normal and 6 clean-out runs, for an average recovery of 674 grams per run. Overall recoveries, based on material balance figures, were 89.1 and 95.1 percent, respectively.

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A total of 74 PR cans of stabilized MR product solutions and EPT solutions were sent to Purex during the week. This material has been processed with no reported difficulty, and additional material will be accepted during the week ending 1-26-64.

Hood 227

Processing of spent resin and two filters from hood 7-A was conducted in this facility during the week. Activity was curtailed for two shifts during the early part of the week due to a plug in the transfer line to the hood 7-C vacuum trap. Emphasis on dissolution efforts resulted in reduced activity due to the lack of manpower.

In an effort to reduce the amount of spent resin stored in the duct level, processing of this material was also conducted in the incinerator leach hood. Two 4-liter bottles of resin were processed, with the recovery of approximately 330 grams of plutonium. As of 3:00 PM on 1-20-64, 103 bottles of resin were stored.

R & B Hood

Removal of material from the R & B hood floor continued during the week. To date, a total of approximately 5 kgs of plutonium have been removed, based on laboratory analyses giving the weight percent plutonium.

Incinerator

There was no incinerator operation during the week. The furnace was cooled to permit inspection of the upper burning chamber. The discharge end was found to be almost completely restricted by a build-up of clinkers and soot on the short section of baffle which had not been removed when the incinerator repairs were in progress in mid-1963. Clean-out of the upper chamber and the four vertical flues is still in progress.

Four bottles of spent ion exchange resin were washed in the leach pots to remove residual plutonium and nitric acid prior to discarding the resin. Rinse water was boiled to reduce volume prior to loading into storage cans. The analysis of the first batch of solutions loaded into an SN can indicated a total of 30 gms Pu/liter, of which 2.6 gms Pu/liter was in the form of solids. The wash procedure has been modified to require the addition of nitric acid prior to heating the solution to prevent the formation of polymer.

Stainless steel corrosion test coupons which had been suspended in the scrubber tank for over a year were removed on 1-17-64 for inspection by corrosion chemists.

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January 27, 1964

Z-PLANT WEEKLY REPORT

TASK I - II

One hundred fifteen (115) kgs of plutonium were processed with an aqueous recycle of 1.7 percent. The average on-line rate was 1650 grams of plutonium per hour, with a mechanical efficiency of 90 percent. A total of 1931 grams of plutonium was recovered from the ion exchange facility at an average concentration of 37.9 grams of plutonium per liter. Thirty-five (35) grams of plutonium were discarded to waste at an average concentration of 0.005 gram of plutonium per liter. Recovery of plutonium feed to ion exchange amounted to 98.2 percent.

All buttons met product specifications. The average density was 19.38 g/cc. The total impurities, as averaged on 27 of 50 buttons produced, was 1273 ppm. Carbon averaged 234 ppm; Fe, Cr, and Ni averaged 172 ppm; Al, Cu, Si, and Sn averaged 18 ppm; and Mg averaged 693 ppm. The average yield was 98.1 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 1.14 percent of charge.

The Fischer-Porter magnetic flowmeter used for controlling the feed flow from hood 7-C to hood 9-A failed on 1-24-64. This particular teflon-lined unit lasted $4\frac{1}{2}$ months in this service as compared to the 3-month life of similar units with vitreous enamel linings used in this location. The cause of failure is yet to be determined. However, evidence available indicates the failure may have been due to corrosion of the electrical connections. Attempts to restore the instrument to operating condition will be made. Another teflon-lined unit with platinum electrodes is available for installation.

RECOVERY OPERATIONS

Oxide Dissolution

A total of 38.4 kgs of plutonium were recovered in the glass dissolvers in rooms 149 and 161. Operation of the dissolvers was nearly continuous during the week. A small electrical fire was detected in hood 2 of room 149 near midnight of 1-26-64. The fire was extinguished quickly, with no contamination spread or injuries. Operation of the dissolver was resumed the next day.

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An additional total of 17.8 kgs of plutonium was recovered in the hood 42 teflon-lined dissolvers. The M-1 heating element failed on 1-20-64 and had to be replaced. Other maintenance work was required to repair leaks occurring at the former M-1 ANN addition line, the M-1 water jacket (water blanked off), and the M-2 spool piece. The overall average recovery was 627 grams per run, and the material balance recovery efficiency was 85.8 percent.

The 56.2 kgs of plutonium was recovered from stabilized feed material for further purification in the Purex Plant. During the week 11 cans containing lab wastes and 30 PR cans containing dissolver product solutions were sent to Purex. Sixteen (16) cans containing solid crystals were returned by Purex for refiltering and flushing. This operation was conducted in a small greenhouse erected in front of the open-faced hood located in room 166.

Hood 227

One bottle of resin was processed in this facility, leaving the inventory at 102 bottles stored in the duct level. Material from the hood 7-A floor and rags from hood 42 were also processed. Approximately 210 grams of plutonium were recovered from the hood 42 rags. The hot plate used to heat the leach tub failed on 1-23-64 and was replaced.

Incinerator

Clean-out of the incinerator secondary burning chamber was completed on 1-20-64, and heating was started on 1-21-64. The entire length of the upper chamber and the four connecting flues were cleaned. A few small pieces of the remaining section of baffle were removed, as well as six cans of ash containing an estimated 350 grams of plutonium. Early in the week the scrubber off-gas heater thermostat and the incinerator secondary heat controls were repaired. The incinerator nitrogen purge system was connected to a bottle manifold system on 1-24-64.

Operation of the incinerator was resumed on 1-22-64, with 37.75 hours of burning being completed during the week. The belt was shortened on 1-24-64. Eight (8) boxes of waste material were processed through the sorting hood, resulting in 14 cans of ash. The scrubber solution was changed three times during the week. Material balance data for the week are as follows:

Boxes In

1050 gm Pu

Ash Out

1374 gm Pu

Scrubber Solutions

11.1 gm Pu

Spent resin washing was continued in the leach hood during the early part of the week, with solution volume reduction being done later in the week. On 1-25-64 the final solution, containing 47 g Pu/liter, was transferred to an SN can.

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The incinerator and part of the off-gas piping were surveyed with the 380 KEV gamma detector following completion of the furnace clean-out. Information collected will be compared with readings taken several months ago.

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February 10, 1964

Z PLANT WEEKLY REPORTTASK I - II

One hundred three (103) kgs of plutonium were processed with an aqueous recycle of 2.85 percent. The average on-line rate was 1600 grams of plutonium per hour, with a mechanical efficiency of 65 percent. A total of 2941 grams of plutonium was recovered from the ion exchange facility with an average concentration of 36.8 grams of plutonium per liter. Fifty (50) grams of plutonium were discarded to waste at an average concentration of 0.008 gram of plutonium per liter. Recovery of plutonium feed to the ion exchange facility amounted to 98.3 percent.

The line went down on 1-31-64 and stayed down during the rest of this period. However, the ion exchange facility continued to process the solutions from leaching the spent resin on hand, and 4984 grams of plutonium were recovered at an average concentration of 47.9 grams of plutonium per liter. Forty-seven (47) grams were discarded to waste at an average concentration of 0.018 gram plutonium per liter. Recovery of the plutonium in the leach solutions amounted to 99.0 percent.

Two buttons failed to meet density specifications. The average density of the acceptable buttons was 19.43 g/cc. Total impurities were 1457 ppm. Carbon averaged 248 ppm; Fe, Cr, and Ni averaged 261 ppm; Al, Cu, Si, and Sn averaged 22 ppm; and Mg averaged 804 ppm. The average yield was 98.7 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 0.64 percent of charge.

RECOVERY OPERATIONSOxide Dissolution

A total of 20.5 kgs of plutonium was recovered in the glass dissolvers in room 149 and room 161 during this period. An additional 3.6 kgs were recovered in the hood 42 dissolvers. Dissolver operations were suspended on 1-31-64 as Purex had completed their recycle program and the button line was not in operation last week. Installation of a perforated polypropylene basket in the M-2 dissolver of hood 42 was completed on 1-30-64 but has not been tested as yet. This basket was designed to provide circulation of the solution through the oxide by supporting the material in the region of the most violent boiling action, and its use should result in more efficient dissolution.

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Resin Leach

Manpower normally used for dissolver operation was utilized in a concentrated effort to reclaim the plutonium from the spent ion exchange resin which is stored in the duct level. Both hood 227 and the new leach hood in the incinerator building were used during the period for this purpose. The inventory of resin stored was reduced from 103 four-liter bottles to 38 as of 8:00 AM 2-10-64. Recovery has been excellent, and the solutions have been processed through the ion exchange facility with only minor problems encountered.

Incinerator

Twenty-two (22) boxes of waste and 19 liters of R & B hood floor sludge were processed through the 232-Z Building during this period, resulting in 34 cans of ash, 7 boxes of hood waste, 6 batches of leach solution, and 6 scrubber batches.

The incinerator was operated for 58.5 hours, although the operation was quite erratic due to problems with the feed material conveyor incinerator belts. The rubber conveyor belt between the feed hopper and the incinerator feed hood jammed early on 1-27-64 and was not freed until 1-31-64. Several large pieces of teflon tubing and other hard plastic were removed. The belt again jammed on 2-8-64 but was freed within a few hours. A large accumulation of plastic material was removed.

The incinerator belt stopped on at least three occasions during this operating period. On two occasions, it was necessary to shorten the belt because of excessive stretching. Late on 2-6-64 the primary outlet air supply pipe broke and jammed the belt. During investigation of the failure, the primary inlet air supply pipe was found to have a large hole, apparently caused by corrosion and heat effects. This pipe was replaced but the outlet supply pipe was not. The present belt (Nichrome V) has been in service since 10-22-63, but will have to be replaced soon.

Operation of the Vanton pump in the leach hood No. 1 was not very satisfactory during the last week. Inspection of the pump and lines did not reveal any reason. The flexiliner was replaced on 2-5-64, but this did not improve the operation. A replacement pump will be installed.

A rough plutonium material balance for the material processed is as follows:

	<u>In</u>		<u>Out</u>
Boxes	2300 gms	Ash	2830 gms
R & B sludge	<u>885 gms</u>	Leach	330 gms
		Scrubber	27 gms
		Waste	<u>238 gms</u>
Total	3185 gms		3425 gms

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Leach hood No. 2 was sealed, and the gasket between it and leach hood No. 1 was cut on 1-27-64. Final piping installations were completed to allow transfer of leach solutions from leach hood No. 2 to leach hood No. 1 and transfer of scrubber solution solids removal waste streams to D-6. Check-out of the system for transferring scrubber solutions from the scrubber cell to the new hood was completed on 1-31-64.

The leaching facilities of the new hood were put into service on 1-30-64 for washing anion exchange resins in order to reduce the inventory of stored, used resin. Approximately 50 bottles of resin, containing an estimated 1700 grams of plutonium, were washed, with approximately 2400 grams of plutonium being recovered. The recovered solutions are being transferred to hood 46 ion exchange facility for recovery.

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February 24, 1964

2-PLANT WEEKLY REPORT2-10-64 TO 2-24-64TASK I - II

Two hundred nine (209) kgs of plutonium were processed with an aqueous recycle of 4.9 percent. The average on-line rate was 1475 grams of plutonium per hour, with a mechanical efficiency of 75 percent. A total of 10,186 grams of plutonium was recovered from the ion exchange facility at an average concentration of 55.3 grams of plutonium per liter. One hundred twenty-nine (129) grams of plutonium were discarded to waste at an average concentration of 0.009 gram of plutonium per liter. Recovery of plutonium feed to ion exchange facility amounted to 98.7 percent. The plutonium (approximately 3.5 kgs) recovered by processing solutions obtained from washing resin stored during 1963 is included in the above total, and accounts for the relatively high recycle rate. Exclusion of this amount would give a calculated recycle rate of 3.1 percent for this operating period.

All buttons met density specifications, with an average of 19.28 g/cc. Total impurities, as averaged on 45 of 96 buttons produced, was 2270 ppm. Carbon averaged 269 ppm; Fe, Cr, and Ni averaged 328 ppm; Al, Cu, Si, and SN averaged 85 ppm; and Mg averaged 1056 ppm.

The average yield was 98.2 percent. Reduction loss to slag and crucible, as averaged by the neutron counter, was 1.53 percent of charge.

RECOVERY OPERATIONSOxide Dissolution

A total of 51.9 kgs of plutonium was recovered in the glass dissolvers located in rooms 149 and 161. Acid bottles, which were returned from these rooms for refilling recently, have been found to be contaminated in the zone I chemical preparation room. To prevent a recurrence of this situation, a line was installed which enables the operators to obtain the E-acid used for this purpose on the mezzanine of room 221 (2-12-64). The transfer of acid bottles between zones I and III has thereby been eliminated. Two condensers were replaced during the period.

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Hood 227

Processing of stored resin continued, both in this facility and the incinerator leach hood. The last bottle of resin was washed on 2-13-64. Since that time, the hood has been used for processing 7-A floor material and filters, and for transferring demister solutions through hood 7-C to the ion exchange facility. A total of only 9 bottles which contain demister solution is now stored in room 263 of the duct level. This material is being processed as rapidly as possible.

232-Z BuildingGeneral

Twenty-three (23) boxes of waste, 20 bottles of used anion exchange resin, and two bottles of miscellaneous solutions were processed through the Contaminated Waste Recovery Facility during this report period. An approximate material balance for the building is as follows:

Input

Waste boxes:	2608 gms Pu
Miscellaneous solutions:	185 gms Pu
Resin:	<u>850 gms Pu</u>
TOTAL	3643 gms Pu

Output

Ash:	2139 gms Pu
Leach solutions:	327 gms Pu
Hood waste:	115 gms Pu
Scrubber solutions	25 gms Pu
Resin wash solutions:	<u>864 gms Pu</u>
TOTAL	3470 gms Pu

Incinerator

The incinerator, while operating for approximately 74 hours, produced 29 cans of ash. Eight batches of scrubber solution were discarded. Operation of the incineration was very erratic due to a number of reasons. On 2-11-64, the Nichrome V belt which had been in place since late October, 1963, was replaced with an Inconel Alloy 604 belt. The Nichrome belt deteriorated very rapidly during the last week it was in use. On 2-12-64 it was necessary to dismantle the belt housing and free the drive pulley, which was jammed. At this time, several small hard-surface knobs were welded to the drive pulley to improve the contact between the belt and pulley so that

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some of the weights could be removed from the tail pulley, and thus reduce stretching of the belt. On other occasions, the belt was stopped by pieces of pipe broken from the primary outlet air supply and by the inlet flame arrestor, which dropped down onto the belt. Operations were restricted for 3 days by failure of one off-gas blower motor and were down completely for one day while the motor was replaced. Excessive smoking at the incinerator inlet on 2-20-64 was eliminated by reducing the amount of air added to the off-gas system from the leach hood and increasing the flow of incinerator primary inlet air. At the end of the report period, operations were suspended to permit replacement of the large off-gas filter.

Leach Hood No. 1

The Vanton pump was replaced on 2-11-64 with a new unit from spare parts. Operation was improved but not as greatly as had been expected. Miscellaneous leaching operations were performed during the report period. Two bottles of solutions from the Hanford Laboratories were also processed.

Leach Hood No. 2

Washing of used anion exchange resin was continued during the first few days of this report period using the special screens built for the purpose. The backlog of used resin was completely processed to eliminate a storage and safety problem.

On 2-11-64 it was noted that one of the 8-foot high, 6-inch diameter glass tanks (TK-5) was badly cracked. The tank had not yet been used for processing scrubber solutions. The tank was removed on 2-14-64 and will be replaced when a new tank is available. Failure apparently resulted from extreme stresses at the bottom flange.

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March 9, 1964

Z-PLANT WEEKLY REPORTFROM 2400 2-23-64 THROUGH 2400 3-8-64TASK I - II

One hundred eleven (111) kgs of plutonium were processed with an aqueous recycle of 6.0 percent. The average on-line rate was 1362 grams of plutonium per hour, with a mechanical efficiency of 85 percent. A total of 6,637 grams of plutonium was recovered from the ion exchange facility at an average concentration of 46.6 grams of plutonium per liter. One hundred two (102) grams of plutonium were discarded to waste at an average concentration of 0.011 gram of plutonium per liter. Recovery of plutonium feed to ion exchange facility amounted to 98.5 percent.

Two buttons failed to meet product specifications, one due to density and the other due to impurities. However, the one button high in impurities was produced from filter case powder from the fluorinator off-gas system. The average density was 19.32 g/cc. The average impurity of the acceptable buttons was 1967 ppm. Carbon averaged 216 ppm; Fe, Cr, and Ni averaged 323 ppm; Al, Cu, Si, and Sn averaged 83 ppm; and Mg averaged 847 ppm. The average yield was 97.5 percent. Reduction loss to slag and crucible was 2.3 percent of charge.

RECOVERY OPERATIONSOxide Dissolution

The glass dissolvers were operated throughout the period with only minor operations. Four of the six condensers required replacement during this period. A total of 51.4 kgs of plutonium was recovered in this equipment.

Hood 227

Processing of various materials was conducted in this facility during the period. Materials processed included 3 bottles of demister solution, 4 filters from hood 7-A, 2 filters from hood 9-A, and material from the hood 6 floor.

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Contaminated Waste Recovery Facility

General

During this two-week period 33 boxes of waste were processed with 35 cans of ash, 8 boxes of sorted waste, 6 batches of leach solution, and 7 batches of scrubber solution being produced. An approximate material balance is as follows:

<u>Input</u>	<u>Output</u>
Waste boxes: 3807 gm Pu	Ash: 3072 gm Pu
	Leach solutions: 691 gm Pu
	Waste boxes: 159 gm Pu
	Scrubber solutions: 12 gm Pu
 TOTALS 3807 gm Pu	 3934 gm Pu

Incinerator

Incinerator operation during this period was very erratic due to problems with the incinerator belt, the feed belt, and other miscellaneous items. A total of 81.5 hours of burning was completed. On 2-24-64 the large scrubber off-gas filter was replaced. The incinerator belt was shortened on 2-24-64. It jammed several times during the following two weeks, and was out of service for three days while the discharge end housing was removed for inspection. The belt operated satisfactorily at temperatures between 600° C and 700° C but would hang up at 800° C. On 3-7-64 the cleats on the belt were hammered to reduce the overall height. This provided some relief. Several cleats have broken off or bent backward due to inadequate welding. At present, the possibility of removing all but four or five cleats is being considered.

The rubber feed belt plugged or jammed on several occasions. On 3-2-64 replacement of the belt was attempted, but the new belt was ~ 2 - 3 feet short, so the old belt was reinstalled. Breakage of the drive chain occurred twice on 3-8-64.

Smoking occurred several times at the feed inlet during the period. Addition of "Red Devil" soot remover was started on a routine basis in an attempt to keep the burning chambers and off-gas lines clean.

Scrubber Cell

The scrubber solution circulation pump shorted out on 2-24-64 and was replaced with a new unit. Failure was due to corrosion of a stator housing seam weld. The pump had been in service since 12-20-63. The scrubber was given an acid flush on 3-5-64.

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HW-80356 RD

Leaching Operations

Both leach hoods were in service during the report period. Leach hood #2 was used mainly for the leaching of gloves. A new "inside out" sock filter was installed in leach hood #1 on 3-2-64 to replace the dual "outside in" installation.

Scrubber Solution Solids Removal

A test program for removal of solids from the scrubber solutions was issued on 2-24-64. The first treatments using a nitric acid-casein glue coagulation process were made on 3-2-64. Further treatments were made on 3-4-64 and 3-6-64. The addition rate of the nitric acid to the basic scrubber solution appears to be limited to 0.25 - 0.30 liter/minute due to the foam resulting from the neutralization reaction. Satisfactory coagulation and separation of the solids was not accomplished during the week. Further tests with nitric acid-glue mixtures and with commercial coagulants are planned.

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Z-PLANT REPORT

FROM 2400 3-8-64 TO 2400 3-29-64

TASK I - II

Three hundred thirty-four (334) kgs of plutonium were processed with an aqueous recycle of 5.93 percent. The average on-line rate was 1471 grams of plutonium per hour, with a mechanical efficiency of 65 percent.

A total of 19,788 grams of plutonium was eluted from the ion exchange facility at an average concentration of 48.4 grams plutonium per liter. Two hundred sixty-seven (267) grams of plutonium were discarded to waste at an average concentration of 0.013 grams of plutonium per liter. Recovery of plutonium feed to the ion exchange facility amounted to 98.7.

All buttons met present product specifications, and all but two met the specifications proposed by Weapons Process Engineering. These two are out due to Ti. The average density was 19.41 g/cc. Total impurities, as averaged on 78 of 148 buttons, was 1111 ppm. Carbon averaged 204 ppm; Fe, Cr, and Ni averaged 150 ppm; Al, Cu, Si, and Sn averaged 15 ppm; and Mg averaged 602 ppm. The average yield was 98.1 percent. Reduction loss to slag and crucible was 2.33 percent of charge.

Another magnetic flowmeter, used to control the flow of feed, failed during the period, after being in service for only two months. Investigation revealed failure was due to corrosion of one of the electrode lead wires by liquid which entered as a result of breaking a glass seal. This damage could be caused only by dropping the flowmeter, which must have occurred during the recent relocation of the instrument by Minor Construction personnel.

RECOVERY OPERATIONS

Oxide Dissolution

A total of 55.2 kgs of plutonium was recovered in the glass dissolvers in rooms 149 and 161 during the period. Production was limited during the first two weeks of the period to preclude build-up of an excessive backlog of dissolver product solution, as excessive down time curtailed the amount of this material processed through the button line. Only minor operating problems were experienced.

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HW-80356 RD

Hood 227

A total of 8 bottles of plutonium-loaded resin from a hood 46 column was processed in this facility during the period. Approximately 2.5 kgs of plutonium were recovered and sent back to the ion exchange unit. Two powder pans and 3 filters from hood 7-A were also leached in the hood prior to their disposal.

CONTAMINATED WASTE RECOVERY FACILITYGeneral

Fifty-five (55) boxes of waste material, including one box of repackaged waste from 232-Z, were processed during this period. Sixty (60) cans of ash, 10 batches of scrubber solutions, 23 batches of leach solutions, and 40 boxes of repackaged waste were produced. One box was reprocessed through the sorting hood, and two packages were sent to hood 227. The overall material balance is listed below:

<u>Input</u>		<u>Output</u>	
Boxes	5617 gms Pu	Ash	4915 gms Pu
		Leach solutions	1864 gms Pu
		Waste boxes	520 gms Pu
		Scrubber solutions	14 gms Pu
	<hr/> 5617 gms Pu		<hr/> 7313 gms Pu

Incinerator System

Operation of the incinerator was limited to 85.5 hours during the period by a combination of problems. The feed chopper jammed on 3-21-64 and was out of service for two shifts. Operation was very erratic from 3-26-64 through 3-29-64, with very little chopping being done. During the first three days of the period, the rubber feed belt carrying chopped material from the bin to the incinerator belt plugged several times. It was finally replaced with a better belt on 3-11-64. Jamming of the incinerator belt continued during the early part of the period. All of the cleats were removed to reduce the height of the belt and operation improved, although some jamming does occur occasionally at high temperatures (~ 800 C). A clean-out window was installed on the side of the drive drum housing in the ash hood to facilitate removal of hard materials which could jam the drive drum.

Smoking at the incinerator inlet was a problem throughout the period. On occasion, the off-gas temperature exceeded 600° C, and the cyclone became red hot. Changing of the ash hood filters and a good clean-up of the hood on 3-15 and 3-16-64 improved the situation but did not completely eliminate the problem. Smoking and backfires started again on 3-25-64 and became so bad that the incinerator was cooled to permit a clean-out of the secondary chamber and the flues joining the chambers on 3-28-64. Following this work, operation was excellent, with no differential pressure being indicated between the incinerator secondary chamber and the ash hood.

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Scrubber System

The scrubber solution recirculation pump failed on 3-16-64 after being in service for only three weeks. Investigation of the pump revealed pitting corrosion similar to that present in previous failed pumps. It appears that hypochlorite is responsible. An analytical method was developed by the Control Laboratory, and hypochlorite was detected in the scrubber solutions. The burning of plastics has been discontinued for the present. Use of a higher concentration of sodium hydroxide and the addition of urea to the scrubber solutions will be tested.

Plugging of the scrubber off-gas filters and loss of liquid from the scrubber tank became severe during part of the period covered by this report. On 3-18-64 approximately 28 liters of scrubber solution were entrained to the filter. The solution was removed and discarded on 3-19, and both off-gas filters were replaced. The scrubber was also given two 10% HNO_3 flushes. On 3-21 the scrubber off-gas heater failed. Operation was continued without the heater until 3-27-64 when a new unit was installed. On 3-26 the off-gas filter differential pressure reached 8 inches of water, and the scrubber off-gas flow decreased to 50 cfm from the normal 70 - 75 cfm. Solution was also carried overhead from the scrubber to the filter. The liquid was removed and the filter was replaced on 3-26-64. A 15% nitric acid flush of the scrubber was made in an attempt to remove solids from the tower. It appears that scrubber solution is still being held up in the tower during operation of the circulation pump and off-gas fans.

Leaching

Leach hood #1 was used extensively for the leaching of gloves and metal objects. Leach hood #2 was used sparingly until the burning of plastic was discontinued. The hood was then utilized for the cleaning of large sheets of plastic by wiping and washing. On 3-24 a valving error resulted in the overflow of several liters of nitric acid from the chemical addition tank (TK-1) to the hood floor. No damage resulted. The solution was jetted from the floor to the leach solution product tank (TK-9).

Scrubber Solution Coagulation Studies

Scrubber solution coagulation studies using casein glue and nitric acid were attempted twice early in March. Another test was started on 3-18 but was discontinued when no nitric acid was available. The process included addition of the aqueous glue mixture to the scrubber tank for mixing with the scrubber solution. During the mixing on 3-18, a small amount of foam and "crud" entered leach hood #1 by way of the hood vent line to the scrubber. Following transfer of the glue-scrubber solution mixture to the storage tanks in leach hood #2, the scrubber was flushed several times with water, but the flushes were apparently not adequate to remove all of the solids present. Partial plugging of the scrubber plates occurred, resulting in the loss of solution to the off-gas filter previously mentioned.

Further testing with glue has been discontinued as a result of this problem and the foaming and possible overheating occurring during the nitric acid addition step.

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HW-80356 RD

Distribution:

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April 13, 1964

Z-PLANT REPORT
TASK I-II & RECOVERY OPERATIONS
FROM 2400 3-29-64 TO 2400 4-12-64

TASK I - II

Two hundred sixty-one (261) kgs of plutonium were processed through tank THT in hood 7-C with an aqueous recycle of 1.3 percent. The average on-line rate was 1612 grams of plutonium per hour, with a mechanical efficiency of 78 percent. A total of 3429 grams of plutonium was recovered from the ion exchange facility at an average concentration of 40.8 grams of plutonium per liter.

One hundred fifty-eight (158) grams of plutonium were discarded to waste at an average concentration of 0.01 gram of plutonium per liter. Recovery of plutonium feed to ion exchange facility amounted to 95.6 percent.

Three buttons failed to meet specification, two because of low yield and one because of low density. The average density of the acceptable buttons was 19.47 g/cc. Total impurities, as averaged on 35 of 119 buttons produced, was 750 ppm. Carbon averaged 287 ppm; Fe, Cr, and Ni averaged 62 ppm; Al, Cu, Si, and Sn averaged 10 ppm; and Mg averaged 330 ppm. The average yield, not counting the two reject charges, was 96.6 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 4.95 percent of charge.

RECOVERY OPERATIONS

Oxide Dissolution

A total of 37.4 kgs of plutonium was recovered from operation of the glass dissolvers in rooms 149 and 161 during the period. No major operating problems were experienced.

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HW-80356 RD

Hood 227

The only activity conducted in the wet end of this hood during the period occurred on 4-2-64 when some material from the hood 7-A floor, containing 56 grams of plutonium, was processed. The facility could not be used during the past week as minor construction forces were rerouting the transfer lines in hood 7-C. Solutions from hood 227, hood 6 floor, and the pickling solution from hood 17-P are now transferred directly to the recently installed aqueous catch tank, which will be used to transfer to the new reclamation facility.

232-Z CONTAMINATED WASTE RECOVERY FACILITY

General

Seventy-six (76) boxes of waste were processed during the report period, resulting in 51 cans of ash, 38 batches of leach solution, 69 boxes of repackaged waste, and 9 batches of scrubber solution. An approximate plutonium material balance is listed below:

<u>Input</u>	<u>Output</u>
Waste boxes: 7655 gms Pu	Ash: 3706 gms Pu
	Leach solutions: 1969 gms Pu
	Repackaged waste: 974 gms Pu
	Scrubber solutions: 23 gms Pu
<hr/> 7655 gms Pu	6672 gms Pu

The chopper was inspected on 3-30 and found to be bound up with matted cardboard and rags. It was cleaned completely, and operation was satisfactory for the rest of the report period. Fires occurred in the chopped feed bin on 4-4 and 4-7, but there was no serious damage. Both fires apparently started from sparks caused by plutonium or calcium particles in the chopper.

Incinerator Operation

The incinerator was operated for approximately 88 hours. The belt stopped on three occasions during this period, but very little burning time was lost. Most of the material burned was rags and cardboard, but small amounts of plastic were also burned. The plastic burned was mainly small pieces which could not be handled easily in the leaching hoods.

Some smoking and back-burning occurred at the inlet to the incinerator. On occasions, it was necessary to reduce the primary inlet air supply to relieve the problem.

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HW-80356 RD

Off-Gas System

The scrubber was flushed with 60% nitric acid on 3-30 to remove solids which were not removed with prior 10% and 15% nitric acid flushes. Two crevice corrosion sample coupons (316 SS) were installed in the scrubber on 3-31. The first sample was removed on 4-8-64 for study by Corrosion Chemistry personnel. The other sample will be left in the scrubber tank until the end of April.

Leach Hoods

Both leach hoods were extensively used during the report period, with leach hood #2 being used mostly for large sheets of plastic.

A 6-inch diameter glass tank, 2 feet high, was installed in leach hood #2 for use in adding coagulant solutions to the scrubber solution solids removal tanks. A process test has been written to cover further studies in the hood.

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HW-80356 RD

Distribution:

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R. L. Walser

April 27, 1964

Z PLANT REPORT
FROM 2400 4-12-64 TO 2400 4-26-64

TASK I - II

One hundred seventy-four (174) kgs of plutonium were processed through the THT tank in hood 7-C with an aqueous recycle of 2.8 percent. However, one batch of elution product solution was held up in the ion exchange facility and will be counted on the next report. The average on-line rate was 1576 grams of plutonium per hour, with a mechanical efficiency of 53 percent.

A total of 4879 grams of plutonium was eluted from the ion exchange facility at an average concentration of 35.1 grams of plutonium per liter. One hundred forty-one (141) grams of plutonium were discarded to waste at an average concentration of 0.011 grams of plutonium per liter.

Three buttons failed to meet product specifications, two due to low density and one due to impurities. The average density of the acceptable buttons was 19.43 g/cc. Total impurities, as averaged on 30 of 74 buttons produced, was 1589 ppm. Carbon averaged 238 ppm; Fe, Cr, and Ni averaged 664 ppm; Al, Cu, Si, and Sn averaged 11 ppm; and Mg averaged 477 ppm. Average yield was 98.1 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 2.44 percent of charge.

RECOVERY OPERATIONS

Activity in both the glass dissolvers and hood 227 was limited during the period as emphasis was placed primarily upon the incinerator operation. Only 3.5 kgs of plutonium were recovered from oxide dissolutions conducted in the room 149 and 161 dissolvers. Activity in hood 227 was limited to the processing of one filter from hood 7-C and 3 filters from hood 7-A. One 4-liter bottle of resin was placed into hood 227 for washing on 4-26.

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HW-80356 RD

232-Z CONTAMINATED WASTE RECOVERY FACILITY

General

Sixty-nine (69) boxes of waste, including 5 boxes of repackaged waste, were processed during this report period. Sixty-five (65) boxes of repackaged waste, 48 cans of ash, 34 batches of leach solution, and 8 batches of scrubber solution were produced.

A rough plutonium material balance is as follows:

<u>Input</u>		<u>Output</u>	
Waste boxes:	5956 grams	Ash:	5086 grams
Repackaged waste:	<u>274 grams</u>	Leach solution:	2018 grams
	6230 grams	Repackaged waste:	878 grams
		Scrubber solution:	<u>30 grams</u>
			8012 grams

Incinerator Operation

The incinerator was operated for 67.5 hours. Smoking at the inlet was experienced early in the period. A clean-out of the vertical flues was made on 4-17, and some improvement was experienced. The answer to the smoking problem still requires study, however, to determine the optimum air flows and incinerator negative pressure.

The inconel incinerator belt failed on 4-20 and was replaced with a stainless steel belt from spare parts. The inconel belt had been in service since 2-11. The belt had performed satisfactorily until the last two weeks of service when scaling and deterioration increased at an accelerated rate. The deterioration appeared to increase following processing of material containing dry chemical fire extinguisher added during a fire in the chopped feed bin on 4-4.

Leaching Operations

Most of the leaching was done in the leach hood #1, with some leaching being done in leach hood #2. Transfer of solutions from the leach pots to the THT was a problem during much of this period due to plugging of the filter and inadequate pumping capacity. On 4-16 the pump was by-passed to permit vacuum transfers. A larger pump has been ordered.

Scrubber Solution Solids Removal

Process test 64-1-PPE(T) was issued on 4-13. The test involves the use of commercial coagulants and/or analytical filter pump for the removal of solids from scrubber solutions. A run was started on 4-15 but was discontinued when approximately 50 liters of scrubber solution drained

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HW-80356 RD

to the hood floor from a broken section of PVC pipe. Two runs using Purifloc 501 and Purifloc 602 were completed on 4-17. A fair amount of coagulation occurred, with the solids rising to the top of the solutions. The solutions were not completely clear at any time. On 4-23 a run was made using analytical filter pump to coat the inside of a polypropylene mesh sock-type filter. Clarification of the solution was not accomplished. Leaks in piping connections and clean-out of the processing tanks have delayed further studies. U

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Distribution:

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R. L. Walser

May 11, 1964

Z PLANT REPORT
FROM 2400 4-26-64 TO 2400 5-10-64

TASK I - II

One hundred ninety-nine (199) kgs of plutonium were processed via the HC-7 transfer head tank (THT) with an aqueous recycle of 3.1 percent. The average on-line rate was 1508 grams of plutonium per hour, with a mechanical efficiency of 62 percent.

A total of 7.7 kgs of plutonium was eluted from the ion exchange facility. On 5-6 at 1800 the aqueous filtrate stream was sent to 880 from hood 9-B on the RMC line, and a total of 215 grams of plutonium was recovered from this source at the new Plutonium Reclamation Facility. A total of 75.9 grams of plutonium was discarded to waste from the ion exchange facility with an average concentration of 0.007 grams of plutonium per liter.

Two buttons failed to meet density specifications. The average density of the acceptable buttons was 19.43 g/cc. Total impurities, as averaged on 50 of 81 buttons produced, was 829 ppm. Carbon averaged 186 ppm; Fe, Cr, and Ni averaged 341 ppm; Al, Cu, Si, and Sn averaged 36 ppm; and Mg averaged 115 ppm.

Average yield was 97.5 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 3.3 percent of charge.

RECOVERY OPERATIONS

Oxide Dissolution

Approximately 18.8 kgs of plutonium were recovered in the glass dissolvers in rooms 149 and 162. No activity was conducted in these areas during the first week of the period as the button line was processing non-representative material at that time and could not use dissolver product solutions.

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HW-80356 RD

Hood 227

Activity in this hood was limited to washing three bottles of resin, leaching two hood 7-A filters, and processing one liter of material from the hood 7-A floor. Manpower normally assigned to this facility was utilized to operate the incinerator leaching facilities during most of the period.

CONTAMINATED WASTE RECOVERY FACILITY

General

Sixty boxes of waste material and one liter of material from the floor of hood 7-C were processed during this period. Forty-two (42) cans of ash, 24 batches of leach solution, 6 batches of scrubber solution, and 44 boxes of repackaged waste were produced. A rough plutonium material balance is as follows:

	<u>Input</u>		<u>Output</u>
Waste boxes:	5522 gms	Ash:	4434 gms
Hood 7-C floor material:	206 gms	Leach solutions:	1747 gms
		Repackaged waste:	440 gms
		Scrubber solutions:	17 gms
Totals	5728 gms		6628 gms

On 4-28 it was necessary to add 2 liters of water to smoldering material in and under the chopped feed hopper. No damage resulted.

Incinerator

The incinerator operation was nearly trouble-free until 5-8. Seventy-six (76) hours of burning were completed with only an occasional report of smoking at the incinerator inlet. The incinerator belt was shortened on 5-7. On 5-8 one of the south secondary heating elements burned out.

On 5-1 installation of incinerator temperature indicating equipment utilizing the spare thermocouples was completed. This equipment contains high temperature controls which will turn off the power to all of the heating elements in case of a high temperature in any one section of the furnace. This equipment is a back-up for the controls already existing in the original furnace temperature recorder-controllers.

Off-Gas System

Process test 64-2-PFE was started on 5-8. The test involves the addition of various quantities of urea to the scrubber solutions and increases in the amounts of plastic which are burned. The urea was recommended as a means of destroying hypochlorite and reducing the corrosion in the scrubber solution circulation pump.

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HW-80356 RD

Leaching Operation

Leach hood #1 was in use constantly during the period of this report. The Vanton model X-B-T6 pump was replaced by a model X-B-T18 pump on 4-28. Transfer of leach solutions from the pots to the head tank was speeded up considerably.

Due to a shortage of storage facilities for leach solutions in the past, and a desire to keep the volume of solution to a minimum, fluoride and ANN were not used as extensively as they might have been. Leach solution analyses indicated the presence of plutonium as solids in most of the batches of leach solution, even though they had been passed through a 40-micron filter. With the start-up of the new Plutonium Reclamation Facility, processing of leach solutions was started. Sodium fluoride and ANN are now being added to leach solutions to reduce the possibility of undissolved plutonium oxide being transferred into the SN or PR cans.

Scrubber Solution Solids Removal

Solids removal studies being conducted in leach hood #2 were interrupted by breakage of PVC piping below the bottom flange of the second treatment tank. The bottom flange on both treatment tanks will have to be changed. Maintenance assistance is rather scarce due to the start-up of the new facility.

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2. W. J. Gartin - J. J. Courtney
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R. L. Walser

May 25, 1964

Z PLANT REPORT
FROM 2400 5-10-64 TO 2400 5-24-64

Two hundred eighty-eight kgs of plutonium were processed through the THT tank in hood 7-C with an aqueous recycle of 2.88 percent. The average on-line rate was 1661 grams of plutonium per hour, with a mechanical efficiency of 74 percent.

All buttons met product specifications. The average density was 19.41 g/cc. Total impurities, as averaged on 89 of 136 buttons produced, was 721 ppm. Carbon averaged 254 ppm; however, three results used in calculating the average value were over 620 ppm and are being rerun. Fe, Cr, and Ni averaged 238 ppm; Al, Cu, Si, and Sn averaged < 27 ppm; and Mg averaged 83 ppm. The average yield was 97.7 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 2.21 percent of charge.

The Ion Exchange Facility has been placed in a standby status. All resin has been removed from the columns and process lines leading to the hood have been plugged.

RECOVERY OPERATIONSOxide Dissolution

A total of 49.7 kgs of plutonium was recovered from oxide dissolution conducted in the glass dissolvers in rooms 149 and 161. Of the total, 23.5 kgs were used for make-up of button line feed batches, and the remaining 26.2 kgs were sent to the new Plutonium Reclamation Facility for purification.

Hood 227

Six 4-liter bottles of used resin were washed in this facility during the period.

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HW-80356 RD

CONTAMINATED WASTE TREATMENT FACILITYGeneral

Thirty-three boxes of waste, two packages of miscellaneous wastes, and one bottle of spent ion exchange resin were processed during the period covered by this report. Leaching and incineration resulted in the production of 19 batches of leach solution, one batch of resin wash, 8 cans of ash, and 3 batches of scrubber solution. Sorting operations resulted in 25 boxes of repackaged waste for eventual disposal and 4 boxes for future burning.

A rough plutonium material balance is as follows:

Waste boxes:	2322 gms Pu	Ash:	1236 gms Pu
Miscellaneous waste:	388 gms Pu	Leach solution:	1062 gms Pu
Ion exchange resin:	129 gms Pu	Resin wash:	129 gms Pu
		Repackaged waste	
		(burial):	249 gms Pu
		Repackaged waste	
		(for burning):	227 gms Pu
		Scrubber solution:	7 gms Pu
Total Input	2839 gms Pu	Total Output	2910 gms Pu

Incinerator

Restoration of the south secondary heating element to service was completed on 5-12. An electrical connector had failed rather than a section of the heating element itself. During the heat-up period following repair, the recently installed Barber-Coleman secondary temperature indicator failed to respond properly. The thermocouple lead wire was found to be faulty and was replaced. Since it was necessary to use #16 wire instead of #18 wire, the temperature indication has been higher than normal. This condition will exist until a resistor is changed in the indicator.

Operation of the incinerator was resumed on 5-13 and continued until 5-19 when the scrubber off-gas heater failed. A total of 23.75 hours of burning was done during this period.

On 5-22 the interior of the primary chamber was partially inspected with a mirror propped at the entrance. The inlet air pipe support bracket was found to be loose on one side. At a spot approximately 3 to 4 feet past the bracket, there appeared to be a golf ball-size protrusion extending down from the top of the chamber. The spot could not be definitely placed, but it will be inspected occasionally to determine any change in appearance.

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Off-Gas System

On 5-15 the scrubber off-gas heater began to ground out. On 5-18 approximately 25 to 30 liters of scrubber solution were lost during 2.5 hours of operation. During this period, off-gas flow and scrubber off-gas temperature were low. The off-gas filter was changed, and several liters of solution were removed from the filter box. The scrubber was flushed with 60% nitric acid to remove any build-up of solids. Operation was resumed on 5-19 but was discontinued after a short time when the off-gas heater burned out completely.

Leaching

Leach hood #1 was in constant use during the period of this report for the leaching of gloves, plastic, and miscellaneous wastes. A small hole developed in the side of the polypropylene filter case but was wrapped with teflon tape, and the filter has not leaked since. Filter socks having 10 and 40 micron retentions are alternately used in the filter. Leach solution analyses still indicate the presence of plutonium solids, even though the use of sodium fluoride is standard. The laboratory has also revised the analytical method to include rinsing of any solids before analysis.

Leach hood #2 was used only for special jobs during this period. One bottle of ion exchange resin was washed on 5-20. A test leaching of graphite molds was done in the pans on 5-22. PV lids were leached on 5-24.

Scrubber Solution Solids Removal

Repair and replacement of broken PVC piping and flanges was started. Nearly all of the PVC equipment in the lower section of the hood will be replaced with stainless steel. The bottom flange on tank 3 has been changed.

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HW-80356 RD

Distribution:

1. R. E. Tomlinson
2. W. J. Gartin - J. W. Fillmore
3. R. J. Sloat - D. T. Crawley -
R. Y. Lyon - R. L. Walser

June 8, 1964

Z PLANT REPORT
FROM 2400 5-24-64 TO 2400 6-7-64

TASK I-II

One hundred three (103) kgs of plutonium were processed through the THT tank in hood 7-C with an aqueous recycle of 4.7 percent. The average on-line rate was 1560 grams of plutonium per hour, with a mechanical efficiency of 50 percent.

All buttons met product specifications. The average density was 19.38 g/cc. Total impurities, as averaged on 22 of 48 buttons produced, was 702 ppm. Carbon averaged 273 ppm (one result over 500 ppm is being rerun); Fe, Cr, and Ni averaged 127 ppm; Al, Cu, Si, and Sn averaged 26 ppm; and Mg averaged 105 ppm. The average yield was 97.3 percent. Total loss to slag and crucible, as measured by the neutron counter, was 3.7 percent of charge. This figure includes some floor sweepings from the hoods which were canned out with the slag and crucible. Accumulated scrap powder was fluorinated in hood 9-A and used to fire 22 buttons.

RECOVERY OPERATIONS

Oxide Dissolution

A total of 28.1 kgs of plutonium was recovered from oxide dissolution conducted in the glass dissolvers located in rooms 149 and 161. All dissolver product solutions produced during the period were sent to the Plutonium Reclamation Facility for purification and concentration prior to use as button line feed.

Hood 227

Activity in this hood was limited to the processing of one beaker of material from the hood 7-C floor, washing one 4-liter bottle of resin, and transferring one bottle of demister solution to the ACT tank in hood 7-C for delivery to the Plutonium Reclamation Facility. The resin was rich in plutonium, as it was removed from the filters and floors of hoods 7-A and 46.

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CONTAMINATED WASTE RECOVERY FACILITYGeneral

Forty-six (46) boxes of waste, including 4 boxes of previously sorted waste, were processed during this period. Sorting, leaching, and burning operations resulted in the production of 41 cans of ash, 18 batches of leach solution, 24 boxes of repackaged waste, and 5 batches of scrubber solution. A rough material balance for the waste processed is as follows:

<u>Input</u>		<u>Output</u>	
Waste boxes	4690 gms Pu	Ash	4607 gms Pu
HLO waste	236 gms Pu	Leach solutions	828 gms Pu
Sorted waste	227 gms Pu	Repackaged waste	239 gms Pu
Repackaged waste	190 gms Pu	Scrubber solutions	17 gms Pu
	5343 gms Pu		5691 gms Pu

Incinerator

Incinerator operation was resumed on 5-27-64 following replacement of the scrubber off-gas heater and thermostat. Back-burning started a fire on the feed belt soon after start-up. Following this incident, a thorough investigation of the incinerator and leach hood venting system was made in an effort to track down the cause of smoking and back-firing at the incinerator inlet. It was determined that the Keystone valve on the leach hood vent line to the scrubber was faulty. Partial blocking of the leach hood outlet resulted in an increase of scrubber inlet vacuum from 2 inches H_2O to 8 inches H_2O . Incinerator operation since that time has been satisfactory, with very little smoking and back-burning. A new valve has been ordered.

Scrubber Solution Solids Recovery

Repair of the treatment tanks in leach hood #2 was completed on 5-28-64. A batch of scrubber solution was transferred to the hood on 6-1-64, and filtration through analytical filter pulp was started on 6-2-64. The filter pulp will retain the particles, but the filter plugs quite rapidly. At present, the solution is being filtered through a 4-inch diameter filter using a precoat of filter pulp. Further tests will be made.

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HW-80356 RD

Distribution:

1. R. E. Tomlinson
2. W. J. Gartin - J. W. Fillmore
3. R. J. Sloat - D. T. Crawley -
L. E. Bruns - R. Y. Lyon -
R. L. Walser

June 22, 1964

Z PLANT REPORT

FROM 2400 6-7-64 TO 2400 6-21-64

TASK I - II

Two hundred twenty-one kgs of plutonium were processed through hood 7-C THT tank, with an aqueous recycle of 2.99 percent. The average on-line rate was 1583 grams of plutonium per hour, with a mechanical efficiency of 61.4 percent.

Six buttons failed to meet product specifications, three due to density and three due to high impurities. The average density of the acceptable buttons was 19.32 g/cc. The total impurities, as averaged on 64 of 99 buttons produced, was 883 ppm. Carbon averaged 297 ppm; Fe, Cr, and Ni averaged 169 ppm; Mg averaged 95 ppm; and Al, Cu, Si, and Sn averaged 33 ppm. The average yield was 97.3 percent. Reduction loss to slag and crucible was 3.6 percent of charge. However, this includes some hood sweepings.

The TMI plus carbon totals reported for the three buttons with low density were 722, 1537, and 574 ppm respectively. On the basis of these results, it was suspected that there were voids in the buttons. The buttons were therefore remelted into ingots, with the following results.

<u>Button No.</u>	<u>Original Density</u>	<u>Ingot Density</u>
24-6-100	18.46	19.05
24-6-101	18.54	18.57
24-6-102	18.42	19.13

Button number 101 fumed and sputtered excessively during the remelting operation and had a skull loss of approximately 600 grams.

The three buttons rejected due to high impurities contained a reported 1000, 5000, and 5000 ppm phosphorous respectively. These buttons will be repickled, resampled from top and bottom, and reanalyzed to determine if the phosphorous is distributed throughout the button or if it is only on the surface.

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HW-80356 RD

[REDACTED]

The source of the phosphorous has been traced to the product from the new Plutonium Reclamation Facility used as button line feed, which apparently contained chemicals used in their process (TEP, DEP). Corrective measures are being taken there (PRF) to prevent recurrence of this problem. In the meantime, button line personnel have been given instructions not to accept PRF product until the results of the spectrographic analysis of the material are available and approved.

P
Prob.

An inspection of the calciner blowback filter elements was conducted on 6-10-64 after reports of excessive steaming at the calciner hopper had continued for two days. Inspection revealed a ^{loose} hose fitting and a hole about the size of a nickel in one of the elements. The filters and the area around them were plugged with powder.

u

Replacement elements available required modification before installation due to misinterpretation of a note on the drawing for this item, which has since been clarified. Operation was resumed at 1700 that day and continued for only 3 shifts before excessive steaming was again noted. Attempts to correct the problem by installing a new off-gas line, tightening fittings, adjusting the blow-back time, etc., proved unsuccessful. The elements were finally removed on 6-17-64, and one was found to be ruptured. Operations were continued during the remainder of the week with no filter elements in the off-gas system. Two elements from hood 9-A and the best of the three removed from hood 9-B on 6-17-64 were installed in the 9-B calciner off-gas system on 6-20-64. The hood has operated two shifts since that time with no report of excess calciner steaming.

u

RECOVERY OPERATIONS

Oxide Dissolution

A total of 10 kgs of plutonium was recovered from operation of the glass dissolvers during the period. A major spread of contamination resulted from the pressurization of hood 4 in room 149, which blew the bottom out of an ice cream carton in the sphincter seal. Contamination was spread to adjoining laboratory rooms and to a small area outside the 234-5 Building. The results of a formal investigation of the incident, conducted on 6-9-64, are included in a report issued 6-15-64 entitled "Radiation Occurrence Investigation - Room 149 - Plutonium Oxide Dissolver". The Room 149 has now been cleaned up, but operation of the dissolvers has not been resumed.

Incident
Rm 149

Room 227

Activity in the facility was limited to washing one 4-liter bottle of resin, 3 blow-back filter elements from hood 9-B, one primary and one secondary fluorinator off-gas filter element, and leaching one beaker of material from the hood 7-C floor.

[REDACTED]

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CONTAMINATED WASTE RECOVERY FACILITY

General

Thirty-one boxes of waste were processed, resulting in 16 cans of ash, 13 batches of leach solution, 21 boxes of repackaged waste, and 3 batches of scrubber solution. A rough plutonium material balance is as follows:

<u>Input</u>	<u>Output</u>
Waste boxes: 2628 gms Pu	Ash: 1947 gms Pu
	Leach solutions: 766 gms Pu
	Repackaged waste: 224 gms Pu
	Scrubber solutions: 11 gms Pu
<hr/> 2628 gms Pu	<hr/> 2948 gms Pu

Sorting, leaching, and burning operations were curtailed considerably during the first week of this report period, while the operators were involved in clean-up of room 149 and other areas contaminated by the dissolver incident. At other times, the sorting and leaching operations kept the operators busy. Thirty-eight hours of burning time were logged by the incinerator.

Process Test 64-1-PPE

Leach Hood #2

Operation of the prototype equipment in leach hood #2, for the removal of solids from scrubber solutions, was continued. Analytical filter pulp retained on a 100-mesh wire screen was tried with some success. Filtration occurred, but the pulp bed plugged rapidly. On 6-17-64 a 10-micron polypropylene filter sock was installed in the 6-inch diameter filter, and a precoat of Johns-Manville Super Cel (diatomaceous earth) was built up in the sock. Twenty liters of scrubber solution were then clarified by recycling through the filter. This was the first time that scrubber solution had been completely clarified in the prototype system. Further tests were made which indicated that the combination of a low micron sock and filter aid could clarify scrubber solutions quite rapidly. Testing was discontinued when polypropylene filter housing was damaged by failure of a weld.

Process Test 64-2-PPE

Urea

Addition of urea to new scrubber solution batches was continued. Hypochlorite analyses were usually less than 0.001 M.

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HW-80356 RD

Distribution:

1. R. E. Tomlinson
2. W. J. Gartin - J. W. Fillmore
3. R. J. Sloat - D. T. Crawley -
L. E. Bruns - R. Y. Lyon -
R. L. Walser

July 8, 1964

Z PLANT REPORT

FROM 2400 6-21-64 TO 2400 7-9-64

TASK I - II

Two hundred fifty-one kgs of plutonium were processed through THT tank in Hood 7-C with an aqueous recycle of 4.0 percent. The average on-line rate was 1567 grams of Pu per hour with a mechanical efficiency of 84 percent.

All buttons met product specifications. The average density was 19.42 grams per cc. Total impurities, as averaged on 61 of 115 buttons produced, was 572 ppm. Carbon averaged 253 ppm; Fe, Cr, and Ni averaged 81 ppm; Al, Cu, Si, and Sn averaged 9 ppm; and Mg averaged 117 ppm. The average yield was 96.2 percent due to several (14) poor yields which went as low as 76.9 percent. To correct this situation the outlet temperature on the fluorinator was increased by 25 degrees and all yields have been very good since this change.

A total of 9.9 kgs of powder was found and removed from the primary Hood 9-B HF filter box located in room 263 during a routine filter change. The package counter indicated this material contained 7843 grams of plutonium, but analytical results indicate the powder contained 32.5 percent plutonium by weight or 3217 grams.

As a result of the discovery of the large accumulation of plutonium, Plutonium Process Engineering has recommended monitoring the ductwork as soon as possible (the area is "on mask" at the present time) and establishing a program to obtain routine neutron counts of the filter. In addition, a safety review will be conducted and a Critical Mass Control Specification for the filter box will be prepared. Operations will conduct routine inspection of the filters and discontinue HF pressurization of the fluorinator tube which has been done in the past to aid in locating leaks in the system. The large amounts of HF sent through the filters as a result of pressurizing the system probably hastened the degradation of the paper filters which were dry and crumbly.

Primary filter changed on 6-23-64.

Secondary filter changed on 6-30-64.

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RECOVERY OPERATIONS

Oxide Dissolution

A total of 25.2 kgs of plutonium were recovered from the glass dissolvers located in Room 161. ~~The~~ Work has been performed in Room 149 since the recent incident except for cleanup operations. The area is now clean, but will not be used until the air flow problems are corrected.

CONTAMINATED WASTE RECOVERY FACILITY

General

Thirty-five boxes of packaged waste and two packages of plutonium fluoride recovered from the 9B Hood filter box were processed. Thirty-two cans of ash, twenty-one boxes of repackaged waste, fifteen batches of leach solution, and five batches of scrubber solution were produced. All processing operations were suspended for five shifts on June 26, 27, and 28 for cleanup of contamination from a filter change.

An estimated plutonium material balance is as follows:

Input

Waste boxes: 3273 gr Pu
9B Fluoride: 776 gr Pu

Ash: 3129 gr Pu
Leach Solutions: 1296 gr Pu
Repackaged Waste: 205 gr Pu
Scrubber Solutions: 10 gr Pu

4049 gr Pu

4640 gr Pu

Incinerator Operation

The incinerator was in use for 58.5 hours during this period. Operation was generally satisfactory, although some feed hood smoking was experienced due to poor vacuum control. The incinerator belt was shortened on June 30. The incinerator was not operated for three shifts on June 30 and July 1 due to a faulty scrubber inlet gas temperature thermocouple.

Leaching Operations

Leach Hood #1 was in constant use. In addition to the normal load, the contents of eight ice cream cartons containing plutonium fluoride from the cleanout of 9B hood filter box were added to the leach pots as sweetener. On July 5, a large quantity of plutonium oxalate found in a waste box was dissolved in a leach pot.

Scrubber Solution Solids Removal

No work was done on solids removal due to the lack of a filter following failure of the polypropylene unit during the previous report period. Rewelding of the spare polypropylene filters is in progress and a stainless steel unit is being fabricated.

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CONTAMINATED WASTE RECOVERY FACILITY

Process Test 64-2-PFE

Urea

Addition of urea to each batch of scrubber solution is continuing. During this report period, approximately 25 percent of the plastic from each box of waste was burned with 0.1 M urea in the scrubber solution. Hypochlorite analyses of the used batches ranged from 0.0006 M to 0.019 M. The last analysis resulted from burning approximately 50 percent of the plastic, while maintaining 0.1 M urea. There has not been a Chempump failure since the burning of less plastic and the addition of urea were started.

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HW-80356 RD

Distribution:

1. R. E. Tomlinson
2. W. J. Gartin - J. W. Fillmore
3. R. J. Sloat - D. T. Crawley -
L. E. Bruns - R. Y. Lyon -
R. L. Walser

July 20, 1964

Z PLANT REPORT
FROM 2400 7-5-64 to 2400 7-19-64

TASK I - II

Two hundred thirty-five (235) kgs of plutonium were processed through the THT tank in hood 7-C with an aqueous recycle of 4.35 percent. The on-line rate was 1468 grams of plutonium per hour, with a mechanical efficiency of 78 percent.

One button failed to meet the density specification. The average density of the acceptable buttons was 19.42 g/cc. Total impurities, as averaged on 38 of 107 buttons produced, was 650 ppm. Carbon averaged 337 ppm; Fe, Cr, and Ni averaged 70 ppm; Al, Cu, Si, and Sn averaged < 7 ppm; and Mg averaged 163 ppm.

The average yield was 95.4 percent. This does not include two pans of powder that did not produce buttons when they were fired. This was caused when HF gas was not entering the fluorinator tube because of a broken HF gas line. The green powder was fired without being fluorinated. Two additional pans of green powder produced during this period were recycled following repair of the HF line and return to normal operation.

Overflow of the filtrate concentrator in the new Plutonium Reclamation Facility resulted in the transfer of approximately 137 grams of plutonium to the D-7 sump tank. This material is being held for processing in the Waste Treatment Facility immediately following start-up.

RECOVERY OPERATIONS

Oxide Dissolution

A total of 28.3 kgs of plutonium was recovered from oxide dissolutions conducted in the glass dissolvers located in room 161.

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CONTAMINATED WASTE RECOVERY FACILITY

General

Thirty two (32) boxes of packaged waste, one box of repackaged waste from the sorting hood, and 12 packages of miscellaneous materials (including 5 packages of plutonium fluoride from the 9-B hood filter box, 2 packages of rags from 9-B hood, 1 package of plutonium fluoride from Plutonium Reclamation Facility, and 4 packages of material from the Redox 233-S Building clean-up) were processed. Forty (40) cans of ash, 25 boxes of repackaged waste, 17 batches of leach solution, and 4 batches of scrubber solution were produced.

An estimated plutonium material balance is as follows:

<u>Input</u>			
Waste boxes	3424 gms Pu	Ash	3451 gms Pu
Miscellaneous wastes	1314 gms Pu	Leach solutions	1380 gms Pu
Repackaged waste	<u>125 gms Pu</u>	Repackaged waste	310 gms Pu
		Scrubber solutions	<u>10 gms Pu</u>
	4863 gms Pu		5151 gms Pu

Incinerator Operation

The incinerator was in use for 61 hours during this period. Difficulty was experienced with the #3 furnace temperature indication early in the period, and on two other occasions the heaters were kicked off due to a probable high temperature on one of the temperature recorder-controllers. On 7-16-64 a #3 furnace secondary heating element lead wire failed in essentially the same location as the failure which occurred early in May. Repairs were completed late on 7-17-64, and burning was resumed on 7-19-64. Following resumption of burning, the primary inlet furnace temperature would not go above 640° C. The incinerator off-gas temperature stayed close to 600° C, and it was necessary to discontinue burning three times to allow cooling.

The stainless steel incinerator belt was replaced with a Nichrome-V unit on 7-14-64.

Leaching Operations

Both leach hoods were used extensively during this period. In addition to normal activities, plutonium fluoride from the 9-B hood filter box was added to several batches in leach hood #1. Several packages of material resulting from clean-up of the 233-S area, following the fire, were processed in leach hood #2. This material included several bottles of resin which were leached and discarded. A box of repackaged waste, containing dry chemical fire extinguisher, was processed in leach hood #2.

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Process Test 64-2-PPE

The concentration of urea in each new batch of scrubber solution was maintained at 0.1 M, while the amount of plastic burned was increased to 50 percent. Hypochlorite analyses ranged from 0.001 M to 0.019 M.

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HW-80356 RD

Distribution:

1. R. E. Tomlinson
2. W. J. Gartin - J. W. Fillmore
3. D. T. Crawley - L. E. Bruns -
R. Y. Lyon - R. L. Walser -
R. J. Sloat

August 3, 1964

Z PLANT REPORT
FROM 2400 7-19-64 TO 2400 8-2-64

TASK I - II

Two hundred six (206) kgs of plutonium were processed with an aqueous recycle of 3.08 percent. The average on-line rate was 1544 grams of plutonium per hour, with a mechanical efficiency of 82.6 percent.

One button failed to meet product specification due to high nickel, and this button is being resampled to confirm the results of the spectrographic analysis. The average density of buttons produced was 19.40 g/cc. The total impurities of the acceptable buttons, as averaged on 61 of 93 buttons produced, was 709 ppm excluding carbon. Fe, Cr, and Ni averaged 293 ppm; Al, Cu, Si, and Sn averaged 74 ppm; and Mg averaged 145 ppm. The average yield was 98.8 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 2.18 percent of charge.

Eleven (11) of 16 consecutive buttons produced contained a reported boron concentration of 10 ppm, or greater vs the normal process average of 2 - 3 ppm. As Weapons Process Engineering has established a limit of 5 ppm on this particular impurity, an investigation was started immediately to determine the cause of the high concentrations. The immediate reaction was to suspect Redox product, as boric acid is used in the make-up of the acid used for flushing their equipment. However, examination of the spectrographic analysis data for two feed batches, from which 11 of the buttons were produced, revealed concentrations of only 5 and 20 ppm boron respectively. In the past, buttons containing less than 5 ppm boron have consistently been produced from feed containing as much as 200 ppm boron. These conflicting results indicated the possibility of contamination of the samples, which was further indicated after receipt and inspection of the complete spectrographic analyses for these buttons revealed the same buttons were reported to have an unusually high silicon content. Each of the 11 buttons involved had a reported silicon content of 20 ppm or greater, with a range of 20 to 1000 ppm, vs the normal average of less

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HW-80356 RD

than 5. A reanalysis of one button sample, originally reported as containing 20 ppm boron and 1000 ppm Si, indicated concentrations of only 5 and 10 ppm respectively. Reruns of the remaining samples have been requested, but results are not yet available. Resamples will be requested if required.

two more buttons gave similar rerun results. Other samples discarded before reruns made.

Buttons shipped to Rocky Flats.

RECOVERY OPERATIONS

Oxide Dissolution

Plutonium nitrate solutions containing approximately 16.9 kgs of plutonium were obtained from the glass dissolvers in room 161 for use as button line feed (presently using 1 can/hood 6 batch). An additional 18 kgs of plutonium obtained from this source was sent to the Plutonium Reclamation Facility for purification.

Contamination of a hood panel on 8-2-64 resulted from liquid leaking to the hood floor and through a glove. The spread of liquid on the hood floor occurred due to plugging of the reflux condenser in the number 3 dissolver. Apparently, ANN solution was added to the dissolver with the acid to be used for a clean-out prior to heating the solutions. Crystallization of entrained ANN gradually plugged the condenser, which fits fairly loosely into the dissolver. When the pressure in the dissolver became sufficient to lift the condenser (after approximately 2 hours of boiling), the vapors condensed on the outside of the condenser and ran down the side of the vessel to the hood floor. The correct procedure for this operation has been reviewed by operations personnel.

Hood 227

Leaching of rags containing oxalate from hood 9-B was conducted on 7-21-64. At that time, it was noticed that the hot plate was not operating properly. The unit has since been replaced, but no other activity was conducted in the hood.

CONTAMINATED WASTE RECOVERY FACILITY

General

Forty-one (41) boxes of packaged waste, 5 packages of plutonium fluoride recovered from the 9-B hood filter box, 1 package of 9-B hood rags, and 1 box of repackaged waste were processed. Fifty-seven (57) cans of ash, 25 boxes of repackaged waste, 12 batches of leach solution, and 6 batches of scrubber solution were produced. An estimated plutonium material balance is as follows:

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<u>Input</u>		<u>Output</u>	
Waste boxes	4371 gm Pu	Ash	4029 gm Pu
9-B fluoride	783 gm Pu	Leach solutions	1063 gm Pu
9-B rags	55 gm Pu	Repackaged waste	283 gm Pu
Repackaged waste	60 gm Pu	Scrubber solutions	26 gm Pu
	5269 gm Pu		5401 gm Pu

Incinerator Operation

The incinerator was in use for approximately 80 hours during this period. Difficulty in maintaining a continuous heat supply was experienced throughout the entire period. Back-up furnace high temperature controls were installed several weeks ago. The controller for furnace #3 (secondary) frequently interrupted the power to the whole system when the temperature exceeded the set point of 1600° F. Much of the problem was traced to faulty instrumentation but was not completely corrected by the end of the week. Incinerator off-gas temperatures were close to 600° C for much of the operating period.

Leaching Operations

Leach hood #1 was in constant use. Transfer of solutions from the leach pots to the THT (transfer head tank) was hampered by plugging of the filter and faulty pump operation. Several leaks were repaired, and the flex-i-liner in the pump was replaced.

Scrubber Solution Solids Removal

Repair of the system in leach hood #2 was completed with installation of a spare polypropylene filter which had been rewelded. A short run was made using Dicalite Super Speed flow diatomaceous earth. The filter sock plugged more rapidly than had been the experience with Johns Mansville Super-Cel. More tests will be made.

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HW-80356 RD

Distribution:

1. R. E. Tomlinson
2. W. J. Gartin - J. W. Fillmore
3. R. J. Sloat - D. T. Crawley -
L. E. Bruns - R. Y. Lyon -
R. L. Walser

August 17, 1964

Z-PLANT REPORT
FROM 2400 8-2-64 TO 2400 8-16-64

TASK I-II

One hundred seventy-four (174) kgs of plutonium were processed with an aqueous recycle of 4.56 percent. The average on-line rate was 1511 grams of plutonium per hour, with a mechanical efficiency of 56 percent.

One button failed to meet density specification. The average density of the acceptable buttons was 19.39 g/cc. Total impurities, as averaged on 43 of 79 buttons produced, was 893 ppm. Carbon averaged 439 ppm; Fe, Cr, and Ni averaged 202 ppm; Al, Cu, Si, and Sn averaged 7 ppm; and Mg averaged 131 ppm. The average yield was 95.7 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 5.1 percent.

The calciner blowback filter elements were replaced on August 14, 1964. Operations reported that the elements were glazed over, and the space between the elements was packed with powder. The elements appeared to be intact. They will be leached and retained as spares. Approximately 15 hours of down-time was required to complete the replacement.

Failure of the feed pump, magnetic flowmeter, and filter cloth all occurred on 8-12-64. As a result, most of the day was required for maintenance activities. The magnetic flowmeter had been in use for 5 months to control the feed flow. This is the longest a meter has lasted in this service.

RECOVERY OPERATIONS

Oxide Dissolution

A total of 25.4 kgs of plutonium was recovered from oxides dissolved in the glass dissolvers located in room 161.

Room 227

One beaker of material from the floor of hood 7-A was processed during the period. More of this material (2 or 3 beakers) remains to be processed.

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HW-80356 RD

CONTAMINATED WASTE RECOVERY FACILITYGeneral

Thirty-one (31) boxes of packaged waste were processed. Forty-three (43) cans of ash, 17 boxes of repackaged waste, 10 batches of leach solution, and 7 batches of scrubber solution were produced.

An estimated plutonium material balance is as follows:

<u>Input</u>	<u>Output</u>
Waste boxes: 3870 gms Pu	Ash 3007 gms Pu
	Leach solutions 638 gms Pu
	Repackaged waste 199 gms Pu
	Scrubber solution 22 gms Pu
3870 gms Pu	3866 gms Pu

Incinerator Operation

The incinerator was in use for 50.5 hours during this period. On 8-3-64 considerable back smoking in the feed end hood and a high off-gas temperature occurred during burning operations. Excessive smoking occurred again on 8-5-64. Cooling of the incinerator was started on 8-6-64.

The secondary combustion chamber was inspected on 8-7-64 and was found to contain a large amount of ash at the feed hood end. The build-up filled approximately one-half of the 5-inch diameter at the feed end, but gradually tapered off to only a thin layer about half way toward the discharge end. Approximately 4 cans of ash were recovered from a clean-out of the pipe. The vertical flues which join the upper and lower chambers were rodded also. There is some question as to whether one flue was completely clean. The smoking and high temperature conditions did not occur following the clean-out.

Middle flue plugged and cleanout later.
Pressurization of the ash discharge part of the primary combustion chamber has become a problem during the past few weeks. Ashes and clinkers which are still burning are being discharged into the can and out onto the hood floor at considerable velocity. A possible fire hazard exists under these conditions. Pressurization also indicates that the system is not operating as designed. An investigation of the situation will be made soon.

Scrubber Operation

Wood ventilation pent house had 10 cans of ash containing 890 grams of Pu
Higher than normal scrubber neutron monitor readings during the past two weeks prompted investigation of the monitor and extra sampling of the scrubber solutions. The background on the monitor has increased from 43 counts per minute at start-up in January, 1962, to 2000 counts per minute at present. Sample results have not been higher than normal. On 8-11-64 the BF₃ tube under the scrubber tank was found to be partially pulled out of the moderator. At that time, the reading was 12,000 counts/minute. After pushing the tube back into position, the reading dropped to 8000 counts/minute. The tank was

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How much Pu would this reading indicate is present
If greater than 100 g. we should stop

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HW-80356 RD

flushed with a dilute nitric acid solution on 8-14-64. The tank interior will be inspected within the near future to determine if precipitates or sludge are building up on the bottom.

white solids

4/8 - 1/4" thick

covering 50% of bottom

sample attempted

will be tried again on 9-2-64

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HW-80356 RD

Distribution:

1. R. E. Tomlinson
2. W. J. Gartin - J. W. Fillmore
3. R. J. Sloat - D. T. Crawley -
L. E. Bruns - R. Y. Lyon -
R. L. Walser

August 31, 1964

Z-PLANT REPORT
FROM 2400 8-16-64 TO 2400 8-30-64

TASK I - II

Three hundred seven (307) kgs of plutonium were processed through hood 7-C head tank with an aqueous recycle of 1.5 percent. The average on-line rate was 1621 grams of plutonium per hour, with a mechanical efficiency of 83 percent.

Six (6) buttons failed to meet product specifications due to low density. The average density of the acceptable buttons was 19.46 g/cc. Total impurities, as averaged on 20 of 136 buttons produced, was 934 ppm. Carbon averaged 371 ppm; Fe, Cr, and Ni averaged 346 ppm; Al, Cu, Si, and Sn averaged 37 ppm; and Mg averaged 131 ppm.

The average yield was 97.3 percent. Reduction loss to slag and crucible, as measured on the neutron counter, was 2.34 percent of charge.

Three of the reject buttons were produced immediately following replacement of the calciner blowback filter elements. Apparently, powder containing metal fines was dropped into the calciner during this operation, which resulted in the contamination of the charge for the next 5 - 6 buttons. The fourth button contained 2100 ppm Fe, the fifth 570, and the sixth 370. Prior to this time, the iron content of 18 consecutive buttons was less than 50 ppm, each.

RECOVERY OPERATIONS

Oxide Dissolution

A total of 40.7 kgs of plutonium was recovered from the dissolution of oxide powder in the glass dissolvers located in room 161. Of the total, 28.7 kgs of plutonium were recovered from burned reject buttons for processing in the Plutonium Reclamation Facility. The remaining plutonium was obtained from dissolution of burned "C" line skulls for use as button line feed.

$$1750 \times \frac{2 \times 10^3}{1 \times 10^6} = 2 \text{ grams}$$

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HW-80356 RD

Room 227

One package of 7-A floor material was dissolved during this period.

CONTAMINATED WASTE RECOVERY FACILITYGeneral

Five (5) boxes of packaged waste and 7 packages of plutonium fluoride recovered from the 9-B hood filter box were processed. Seven (7) cans of ash, 3 boxes of repackaged waste, 3 batches of leach solution, and 2 batches of scrubber solution were produced. In addition, 10 cans of ash were removed during clean-out of the upper hood at the ash discharge end of the incinerator. Burning operations were suspended on 8-19-64 to permit inspection and repairs in the entire system.

An estimated plutonium material balance is as follows:

<u>Input</u>		<u>Output</u>	
Waste boxes	422 gms Pu	Ash	668 gms Pu
9-B fluoride	<u>599 gms Pu</u>	Leach solutions	320 gms Pu
		Repackaged waste	36 gms Pu
	1021 gms Pu	Scrubber solutions	<u>7 gms Pu</u>
			1031 gms Pu
		Ash hood clean-out	890 gms Pu

Incinerator

The incinerator was in use for 14.5 hours prior to shut-down, which was started on 8-19-64 to permit inspection and cleaning of the vertical flues joining the primary and secondary burning chambers, inspection of the filters in the upper ash discharge hood, and other miscellaneous repairs and inspections. Cleaning of the flues was started on 8-25-64, and 3 of them were found to be open on that day. The #3 flue from the feed end was not opened until 8-27-64 when a flexible electricians' tape was driven through the plug. Attempts to look through the flues with a combination of mirrors and lights were unsuccessful. It is felt that the flues are still partially restricted by scale build-up on the pipe walls. A more satisfactory method will have to be developed for cleaning the flues.

On 8-28-64 two attempts were made to inspect the welds between the flues and the secondary chamber, using a boroscope. The attempts were unsuccessful due partly to the need for having the lighted end encased in plastic for contamination control. Viewing characteristics were very poor.

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HW-80356 RD

Clean-out of the upper hood at the ash discharge end was started on 8-23-64. Three (3) of the hood outlet filters were removed. Two of them had charred frames and badly disintegrated filter media, which fell out when the filters were removed. One filter was intact. Removal of ash from the hood continued for the next two days. Ten (10) cans of ash were removed. Air flow patterns in the ash hood were such that ash was carried from the lower hood through two 3-inch diameter holes into the upper hood. The holes will be blocked or plugged with filter medium.

Off-Gas Scrubber

The scrubber tank was inspected on 8-26-64. A layer of white solids approximately 1/8-inch thick covered part of the tank bottom. The layer broke up easily when disturbed with a piece of pipe. Efforts to obtain a sample were unsuccessful due to the presence of a small layer of water in the tank. Another attempt will be made before incinerator operations are resumed.

The crevice corrosion sample coupon which had been in the scrubber since 4-30-64 was removed on 8-26-64. Another sample was installed.

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HW-80356 RD

Distribution:

1. R. E. Tomlinson
2. W. J. Gartin - J. W. Fillmore
3. R. J. Sloat - D. T. Crawley -
L. E. Bruns - R. Y. Lyon -
R. L. Walser

September 14, 1964

Z-PLANT REPORT
FROM 2400 8-30-64 TO 2400 9-13-64

TASK I - II

Two hundred fifty-seven (257) kgs of plutonium were processed with an aqueous recycle of 1.35 percent. The on-line rate averaged 1666 grams of plutonium per hour, with a mechanical efficiency of 75.5 percent. One button failed to meet product specification on density. A burnt hole was detected in the pressure vessel lid after firing the button, and high Fe contamination is probable. The average density of the acceptable buttons was 19.47 g/cc. Due to failure of the emitter, no spectroanalyses were run to determine the purity of the button samples. The carbon averaged 267 ppm. The button yield was 98.2 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 3.1 percent of charge.

RECOVERY OPERATIONS (234-5 Building)

A total of 30.6 kgs of plutonium was recovered from oxide powders dissolved in the glass dissolvers in room 161. Of the total, 28.9 kgs may be used for button line feed. The remaining 1.7 kgs was transferred to the Plutonium Reclamation Facility for purification.

Hood 227

No activity was conducted in the "wet" end of the hood during this period.

CONTAMINATED WASTE RECOVERY FACILITY

Four (4) boxes of packaged waste were processed through the leach hood. Four (4) batches of leach solution and 1 box of repackaged waste were produced. The incinerator was not operated during this period due to continuation of modifications and repairs previously in progress. A new inlet air filter assembly was installed on the upper ash hood, and the holes connecting the upper and lower hoods were plugged. The discharge end air distributor pipe was replaced with a unit constructed of Hastelloy B. The chopper blades were replaced on 9-11-64. Heating of the incinerator was resumed on 9-13-64.

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HW-80356 RD

An estimated plutonium material balance is as follows:

<u>Input</u>		<u>Output</u>	
Waste boxes	407 gms Pu	Leach solutions	418 gms Pu
		Repackaged waste	46 gms Pu
	<u>407 gms Pu</u>		<u>464 gms Pu</u>

A sample of solids from the scrubber tank was obtained on 9-4-64. Analysis indicated plutonium content was 0.16 percent by weight. Dissolution methods are being studied.

1 liter
 1 liter at 2.0 density 2000g/liter 1l of solids
 $2000 \times .0016 = 3.2 \text{ gms Pu/l solids}$

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HW-80356 RD

Distribution:

1. R. E. Tomlinson
2. W. J. Gartin - J. W. Fillmore
3. R. J. Sloat - D. T. Crawley -
L. E. Bruns - R. Y. Lyon -
R. L. Walser

September 28, 1964

Z PLANT REPORT
FROM 2400 9-13-64 TO 2400 9-27-64

TASK I - II

Two hundred fifty-five (255) kgs of plutonium were processed with an aqueous recycle of 2.68 percent. The on-line rate was 1594 grams of plutonium per hour, with a mechanical efficiency of 90.4 percent. On 9-24-64 at 0145, the RMC line started the Euratom plutonium oxide run and produced ~ 47 kgs of plutonium oxide powder with an approximate average plutonium content of 84 percent.

One charge did not fire completely and caused a reject button. The average density of the acceptable buttons was 19.46 g/cc. Laboratory results on impurities of button samples for this period were not available. However, results for the previous period of 8-30-64 to 9-27-64 were as follows: average total impurities was 663 ppm; carbon averaged 283 ppm; Fe, Cr, and Ni averaged 136 ppm; Al, Cu, Si, and Sn averaged 23 ppm; and Mg averaged 152 ppm. The average yield was 96.9 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 4.58 percent of charge.

RECOVERY OPERATIONS (234-5 Building)Oxide Dissolution

A total of 43.6 kgs of plutonium was recovered from dissolution of plutonium oxide conducted in the room 161 glass dissolvers.

Hood 227

One beaker of hood 7-C floor material was processed in this facility during the period.

CONTAMINATED WASTE RECOVERY FACILITYGeneral

Thirty (30) boxes of waste were processed during this 2-week period. Forty-five (45) cans of ash, 14 batches of leach solution, 5 batches of scrubber solution, and 13 boxes of repackaged waste were produced. An estimated plutonium material balance is as follows:

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HW-80356 RD

<u>Input</u>		<u>Output</u>	
Waste boxes	4189 gms Pu	Ash	4116 gms Pu
		Leach solutions	1342 gms Pu
		Repackaged waste	177 gms Pu
		Scrubber solutions	55 gms Pu
	<hr/> 4189 gms Pu		<hr/> 5690 gms Pu

Incinerator Operation

Following its return to service on 9-15-64, the incinerator was in use for 53.25 hours during this period. Operation was generally satisfactory, although movement of the belt appeared to be restricted on 9-21-64. About the same time, the primary outlet air flow began to decrease. A Hastelloy-B air injector pipe, which had been installed during the shut-down, was removed for inspection on 9-23-64. All but one of the air discharge holes were plugged with ash, and the last 6 or 8 inches of the pipe were badly corroded. The pipe was replaced with a standard stainless steel assembly. Hastelloy-B had been suggested as being superior to stainless steel in the incinerator atmosphere. The greatest damage to the air injector pipe appeared to occur in the vicinity of the flue joining the two burning chambers.

Leaching Operations

Leach hood #1 was in nearly constant use. Transfers of solution from the leach pots to the head tank were slow until an extensive repair of piping leaks was completed on 9-16-64. The Vanton pump which had been used for the transfers was removed from service due to corrosion of part of the body assembly. The transfers are now being made by vacuum.

Process Test 64-2-PPE

Addition of urea to each batch of scrubber solution was continued. The initial concentration was reduced from 0.1 M to 0.05 M when operations were resumed on 9-14-64. All contaminated plastic is now being burned. On 9-19-64 the scrubber circulation chempump failed after five months of service. Prior to the failure, the scrubber solution pH had fallen to 4.0 following approximately 19 hours of burning. Hypochlorite analyses have not been available from the laboratory recently due to heavy analytical loads from other operations. Inspection of the pump revealed pin holes in the stator housing. Two phases were shorted to ground. The bearings were in good condition, although the lubrication circulation line was apparently plugged.

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Distribution:

1. R. E. Tomlinson
2. W. J. Gartin - J. W. Fillmore
3. R. J. Sloat - D. T. Crawley -
L. E. Bruns - R. Y. Lyon -
R. L. Walser

October 12, 1964

Z PLANT REPORT
FROM 2400 9-27-64 TO 2400 10-11-64

Task I-II

Two hundred fifty-seven (257) kgs of plutonium were processed through the THT tank in hood 7-C, with an aqueous recycle of 5.95 percent. A leak in the feed line resulted in the accumulation of approximately 7 kgs of plutonium on the floor of HC-7. Excluding this amount from the total aqueous recycle results in a calculated recycle rate of 3.2 percent. The on-line rate was 13.39 grams of plutonium per hour, with a mechanical efficiency of 90.3 percent.

One hundred ninety-three (193) kgs of plutonium oxide were produced for the Euratom program during this period. Emission spectrographic analyses on the Euratom oxide samples showed total impurities, as averaged on 23 of 95 pans produced, were 462 ppm. Ca averaged 96 ppm and Na averaged 212 ppm on 34 determinations received. The average plutonium content of the oxide, based on 45 analyses, was 86.9 percent.

All 23 buttons produced met product density specifications. The average density was 19.44 g/cc. Impurities of the button samples are not available as we are awaiting the laboratory results. Average yield was 98.1 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 3.5 percent of charge.

RECOVERY OPERATIONS (234-5 Building)

Oxide Dissolution

A total of 21.8 kgs of plutonium was recovered from oxide dissolutions conducted in the glass dissolvers of room 161. Of the total, 17.1 kgs were transferred to the Plutonium Reclamation Facility for purification prior to use as button line feed. The remaining 4.7 kgs were suitable for transfer directly to HC-6. Present plans are to place the room 161 dissolvers in standby status prior to November 1, 1964.

CONTAMINATED WASTE RECOVERY FACILITY

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General

Forty-seven (47) boxes of packaged waste and 6 packages of filters and rags from the Plutonium Reclamation Facility were processed. Fifty-eight (58) cans of ash, 21 boxes of repackaged waste, 15 batches of leach solution, and 7 batches of scrubber solution were produced. An estimated plutonium material balance is as follows:

<u>Input</u>		<u>Output</u>	
Waste boxes	5697 gms Pu	Ash	4255 gms Pu
Miscellaneous packages	<u>541 gms Pu</u>	Leach solutions	1521 gms Pu
		Repackaged waste	365 gms Pu
		Scrubber solutions	<u>34 gms Pu</u>
	6238 gms Pu		6175 gms Pu

Incinerator Operation

The incinerator was in use for 65 hours during this period. Operation was satisfactory during the first week, but smoking and back-firing into the feed hood became excessive by 10-8-64. The secondary chamber was rodded on 10-9-64, but smoking was still excessive. Further investigation to locate a possible plug in the off-gas line or flues is in progress.

Scrubber Operation

The circulation pump which had been installed on 9-20-64 failed on 10-3-64 after being in use for 53.5 hours. During this period, the scrubber solution pH had dropped to 8.0 on 4 batches and down to 2.0 on the batch just prior to pump failure. Inspection of the pump revealed pitting corrosion in the longitudinal stator case weld.

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Distribution:

1. R. E. Tomlinson
2. W. J. Gartin - J. W. Fillmore
3. R. J. Sloat - D. T. Crawley -
L. E. Bruns - R. Y. Lyon -
R. L. Walser

October 26, 1964

Z PLANT REPORTFROM 2400 10-11-64 TO 2400 10-25-64TASK I - II

Three hundred twenty-eight (328) kgs of plutonium were processed through the THT tank in hood 7-C with an aqueous recycle of 1.8 percent. The on-line rate was 1800 grams of plutonium per hour, with a mechanical efficiency of 77.2 percent.

All buttons met product density specifications. The average density was 19.45 grams per cubic centimeter. Total impurity content of the buttons could not be determined as only five laboratory results on the button samples have been received as of this writing.

The average yield was 97.2 percent. Reduction loss to slab and crucible, as measured by the neutron counter, was 3.84 percent of charge.

Operating rates were increased on 10-21-64 to a maximum of 2600 grams Pu/hour. The line has operated well since that time at rates of 2200 - 2400 grams Pu/hour. Some trouble was experienced immediately after the increase due to plugging of the fluorinator tube. Investigation by operating personnel revealed the trouble to be due to malfunction of the timer for the tube vibrator. The "On Time" must be set at 3 seconds to obtain the specified vibration time of 1 second. Occasional high reduction losses have been incurred, but the average yield for the period was normal.

Samples required for a step by step impurity and fission product decontamination study for the present button line process and equipment were obtained during the period. The results of this study will be published in an official document upon receipt of laboratory analytical data.

RECOVERY OPERATIONS (234-5 Building)Oxide Dissolution

A total of 34.2 kgs of plutonium was recovered from oxide dissolutions conducted in the glass dissolvers in room 161. Of the total plutonium recovered, 19.0 kgs were suitable for use as HC-6 feed. The remaining 15.2 kgs were transferred to the Plutonium Reclamation Facility for purification. The dissolvers are currently producing material for Plutonium Reclamation Facility use only.

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Hood 227

One beaker of HC-7 floor material was dissolved in this facility during the period. The hood has recently been thoroughly cleaned and will be used only infrequently in the future. Most of the work formerly conducted in this hood is now being conducted in leaching hoods located in the incinerator.

CONTAMINATED WASTE RECOVERY FACILITYGeneral

Eight boxes of packaged waste and 11 packages of miscellaneous materials, including sock filters from the Plutonium Reclamation Facility, rags, and oxide and fluoride powders, were processed. Fourteen cans of ash, 7 batches of leach solution, 3 boxes of repackaged waste, and 1 batch of scrubber solution were produced. An estimated plutonium material balance is as follows:

<u>Input</u>		<u>Output</u>	
Waste boxes	767 gms Pu	Ash	686 gms Pu
Miscellaneous wastes	<u>760 gms Pu</u>	Leach solutions	804 gms Pu
		Repackaged waste	52 gms Pu
		Scrubber solutions	<u>21 gms Pu</u>
	1527 gms Pu		1563 gms Pu

Incinerator Operation

The incinerator was not operated between 10-12-64 and 10-22-64 while investigations of the smoking and incinerator pressurization problems were in progress. While attempting to install a vacuum gauge on the incinerator off-gas line vacuum sensing line, the sensing line was found to have corroded away. Further investigation revealed that the off-gas line had corroded through in two spots where the line originally split to service the two cyclones in parallel. The off-gas line was repaired on 10-16-64. Both cyclones were rodded on 10-17-64 to remove scale deposits in the overhead connecting lines. Hood clean-up and hood ventilation filter changes were made from 10-18-64 to 10-22-64.

Heating of the incinerator was started on 10-22-64, and operation was resumed on 10-23-64. Fourteen hours of burning were completed during the last three days of this report period. The primary inlet furnace temperature measurement thermocouple provided very erratic indication during this time. Plans are underway to change the thermocouple.

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Distribution:

1. R. E. Tomlinson
2. W. J. Gartin - J. W. Fillmore
3. R. J. Sloat - D. T. Crawley -
L. E. Bruns - R. Y. Lyon -
R. L. Walser

November 9, 1964

Z PLANT REPORT
FROM 2400 10-25-64 TO 2400 11-8-64

TASK I-II

Three hundred twenty (320) kgs of plutonium were processed via the THT tank in hood 7-C with an aqueous recycle of 1.42 percent. The on-line rate was 1836 grams of plutonium per hour, with a mechanical efficiency of 82.1 percent. Two buttons failed to meet product specifications due to low density. The average density of the acceptable buttons was 19.39 grams/cc. The total impurities, as averaged on 84 of 147 buttons produced, was 887 ppm. Carbon averaged 168 ppm; Fe, Cr, and Ni averaged 73 ppm; Al, Cu, Si, and Sn averaged 33 ppm; and Mg averaged 328 ppm.

The average yield was 95.9 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 4.66 percent of charge.

The two reject buttons were produced while processing feed which contained PR cans of 880 product loaded out during the early part of October. This material was later found to contain organic material, which has a very adverse effect on button line operations. The average density of the 40 acceptable buttons produced during this period was only 19.23 g/cc, and the average yield for these reductions was 95.2 percent. Analytical data received for 20 of the buttons indicates a high phosphorous content in only 5 of the buttons. In every case where phosphorous was detected, the sample was from the top of the button.

RECOVERY OPERATIONSOxide Dissolution

A total of 7.2 kgs of plutonium was recovered from dissolution of plutonium oxide conducted in the room 161 glass dissolvers. Operation of the facility has now been discontinued for an indefinite period.

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Vacuum Header

Approximately 140 to 160 liters of solution were removed from the 26" Hg vacuum header via the demisters on November 6 and 7, 1964. Investigations are currently under way in an effort to determine the source of the liquid, the amount of plutonium involved, and what action is necessary to prevent a recurrence of this problem.

CONTAMINATED WASTE RECOVERY FACILITY

General

Fifty-two (52) boxes of packaged waste were processed. Sixty-seven (67) cans of ash, 26 boxes of repackaged waste, 15 batches of leach solution, and 9 batches of scrubber solution were produced. An estimated plutonium material balance is as follows:

<u>Input</u>		<u>Output</u>	
Waste boxes	5778 gms Pu	Ash	4098 gms Pu
Miscellaneous wastes	<u>929 gms Pu</u>	Leach solutions	1826 gms Pu
		Repackaged waste	343 gms Pu
		Scrubber solutions	<u>36 gms Pu</u>
	6707 gms Pu		6303 gms Pu

Incinerator Operation

The incinerator was in use for 98 hours during this period. On 10-26-64 the primary inlet thermocouples were repaired. Soldered connections which had melted were replaced with lug-type connections. Operation was generally satisfactory during the first week and a half. Smoking began to be a problem late in the last week.

Scrubber Operation

Scrubber operation control was improved by the replacement of the Keystone valve in the leach hood to scrubber line on 10-29-64. The scrubber off-gas heater was replaced on 11-2-64. During the replacement job, a large amount of scale which had been blocking the inlet line was removed. Off-gas flow rates increased following the removal. The scrubber was given a dilute nitric acid flush on 11-4-64.

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Distribution:

1. R. E. Tomlinson
2. W. J. Gartin - J. W. Fillmore
3. R. J. Sloat - D. T. Crawley -
L. E. Bruns - R. Y. Lyon -
R. L. Walser

November 25, 1964

Z PLANT REPORT
FROM 2400 11-9-64 TO 2400-
11-22-64

TASK I AND II

Two hundred and sixty-four Kgs of Pu were processed through the THT tank in Hood 7C with an aqueous recycle of 2.07 percent. The on-line rate was 1985 grams of Pu per hour with a mechanical efficiency of 61.9 percent.

Nine buttons failed to meet density specifications. The average density of the acceptable buttons was 19.39 grams/cc. Total impurities, as averaged on 42 of 114 buttons produced, was 1582 ppm. Carbon averaged 120 ppm; Fe, Cr, and Ni averaged 960 ppm; Al, Cu, Si, and Sn averaged 28 ppm; and Mg averaged 293 ppm.

The average yield was 96.8 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 4.06 percent of charge.

Seven of the reject buttons were produced consecutively immediately after the use of force was required to free the calciner screw. (The screw had been off for about 10 hours while containing powder and stuck upon an attempted startup.) Analytical data for these buttons indicate greater than 5000 ppm iron, 2000-5000 ppm nickel, and 200-2000 ppm Chromium in each of them. The average Fe, Cr, and Ni content of the forty buttons produced since that time is considerably higher than normal (approx. 1000 ppm vs 73 ppm for previous two-week period).

Analytical results for these impurities will be watched closely in an effort to determine if the high results are due to flaking off of rust particles which should stop in a short time or if due to general corrosion of the screw which would necessitate its replacement in order to produce high quality metal. The average Fe, Cr, and Ni of the last 5 results received was approximately 230 ppm which would indicate the former supposition to be true.

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HW-80356 RD

A possible administrative overbatch was detected on the lower level of Hood 9B during a panel change on November 14, 1964. The overbatch was confirmed when 5,020 grams of oxalate, equivalent to 2292 grams of metal, was removed prior to line startup on graveyard shift, November 16, 1964.

The findings and recommendations of the investigating committee were published in an unclassified document dated November 17, 1964.

CONTAMINATED WASTE RECOVERY FACILITY (11-9-64 through 11-22-64)

General

Sixty-seven boxes of packaged waste and eleven packages of miscellaneous wastes from Hood 9B, Hood 7C, Hood 2 (880), and the Fabrication Line were processed. Seventy-one cans of ash, thirty-one batches of leach solution, twenty-five boxes of repackaged waste, and eight batches of scrubber solution were produced. An estimated plutonium material balance is as follows:

	<u>Input</u>		<u>Output</u>
Wasteboxes	7545 gms. Pu	Ash	6287 gms. Pu
Misc. Wastes	1927 gms. Pu	Leach Solutions	3362 gms. Pu
	9472 gms. Pu	Repkgd. Waste	291 gms. Pu
		Scrubber. Sols.	46 gms. Pu
			9986 gms. Pu

Incinerator Operation

The incinerator was in use for 94.5 hours during this period. Operation was generally satisfactory although on two occasions the incinerator was out of service for six and four shifts, respectively. On 11-13-63 and 11-14-64, it was necessary to replace the leads to one of the primary inlet heating elements. On 11-18-64 and 11-19-64, it was necessary to clean the secondary chamber and rod out the vertical flues to reduce a smoking problem. Since the clean-out, it has been necessary to operate the scrubber inlet vacuum at 10 inches water gauge to reduce smoking into the incinerator feed hood.

Leaching Operation

Several packages of miscellaneous wastes were processed through Leach Hood #1 during this period. These included filter media and Pu F₄ from Hood 9B; mixtures of plutonium oxide, fluoride, and oxalate from the line; material from clean-up of the Hood 7C floor; material from the clean-up of Room 149; pickling hood solutions; and filters from Hood 2 (880) and the Fabrication Line.

The Vanton Flexiliner pump will be removed from the hood since it failed in service and is no longer useable. It will be necessary to further investigate methods of pumping leach solutions through the filter. The Plutonium Reclamation Facility has been experiencing problems with solids which apparently originate in 232-Z leach solutions.

GROUP 1

ADIN

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HW-80356 RD

Scrubber Operation

The off-gas scrubber was given a 20% nitric acid flush on 11-18-64 in an effort to reduce the amount of solids in the system. Addition of urea to each batch of scrubber solution is continuing. The pump presently in service was installed on 10-3-64 and has been used for 244 hours of incinerator operation.

RLW/klr

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-68-

HW-80356 RD

Distribution:

1. R. E. Tomlinson
2. W. J. Gartin - J. W. Fillmore
3. R. J. Sloat - D. T. Crawley -
L. E. Bruns - R. Y. Lyon -
R. L. Walser

December 7, 1964

Z PLANT REPORT
FROM 2400 11-22-64 TO 2400 12-6-64

TASK I - II

Two hundred ninety-seven (297) kgs of plutonium were processed via the THT tank in hood 7 with an aqueous recycle of 2.2 percent. The on-line rate was 1826 grams of plutonium per hour, with a mechanical efficiency of 77.2 percent.

All buttons met product specifications. The average density was 19.44 g/cc. Total impurities, as averaged on 32 of 142 buttons produced, was 653 ppm. Carbon averaged 165 ppm; Fe, Cr, and Ni averaged 134 ppm; Al, Cu, Si, and Sn averaged 25 ppm; and Mg averaged 211 ppm. The average yield was 97.1 percent. One extremely low value of 40.9 percent was not used in calculating the average yield. Reduction loss to slag and crucibles, as measured by the neutron counter, was 3.51 percent of charge.

As indicated above, the Fe, Cr, and Ni content of the buttons has returned to the normal level following the stuck screw incident described in the last report.

The average yield from December 1, 1964, to the end of the report period was 98.7 percent, and it was 98.9 percent for the next 23 buttons produced. The improved yield is believed due to the replacement of a faulty timer on the vibrator for the fluorinator tube, which was conducted on December 1, 1964. The timer was not activating the vibrator relay at the time of replacement, and this trouble was probably experienced intermittently prior to failure resulting in the production of off-standard powders.

Hood 227

Washing of 12 four-liter bottles of resin was conducted in hood 227 by button line personnel. All resin has now been removed from the duct level storage area and has been processed.

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CONTAMINATED WASTE RECOVERY FACILITYGeneral

Fifty-eight (58) boxes of packaged waste and 14 packages of miscellaneous wastes (pickling hood muck and rags, filters and rags from Plutonium Reclamation Facility, hood 6 vacuum trap, and 06 dissolver solids) were processed. Sixty-four (64) cans of ash, 28 boxes of repackaged waste, 17 batches of leach solution, and 11 batches of scrubber solution were produced. An estimated plutonium material balance is as follows:

<u>Input</u>		<u>Output</u>	
Waste boxes	6176 gms Pu	Ash	4510 gms Pu
Miscellaneous packages	582 gms Pu	Leach solutions	1089 gms Pu
		Repackaged waste	388 gms Pu
		Scrubber solutions	57 gms Pu
	<hr/>		<hr/>
	6758 gms Pu		6044 gms Pu

Incinerator Operation

Incinerator operation was satisfactory until 11-29-64, when smoking became a problem. The off-gas temperature was about 600° C at this time. Smoke and flames at the ash discharge on 11-30-64 and 12-1-64 resulted in shut-down of the unit for clean-out and inspection. All four flues joining the two combustion chambers were rodded on 12-1-64, and several hood filters were replaced. There was no smoking following the clean-out.

The incinerator belt jammed on 11-30-64 and 12-2-64. Bolts, nuts, and chunks of metal were removed to free the belt. The belt was shortened on 12-4-64. On 12-6-64 the incinerator belt drive chain apparently broke, but had not been inspected by a millwright at the end of the week.

Scrubber Operation

The scrubber solution recirculation chempump failed on 11-24-64. Inspection revealed pinhole corrosion of the stator housing, with resultant shorting of the electrical windings. The pH of the scrubber solution had been down to 2 on 11-20-64. Recent failures of the scrubber cell pumps have occurred shortly after the pH of the solution has dropped to the range of 2 to 4. Early on 12-4-64, the pH again dropped to 2. Failure of the pump had not occurred by the end of the week. Addition of urea to the scrubber solutions is still being made.

A crevice corrosion sample coupon removed from the scrubber tank on 8-26-64 was inspected this week by a Hanford Laboratories corrosion chemist. He reported that there was no preferential attack. The sample had been in the scrubber for nearly four months.

UNCLASSIFIED

-70-

HW-80356 RD

Distribution:

1. R. E. Tomlinson
2. W. J. Gartin - J. W. Fillmore
3. R. J. Sloat - D. T. Crawley -
L. E. Bruns - R. Y. Lyon -
R. L. Walser

January 4, 1965

Z-PLANT REPORT
FROM 2400 12-6-64 TO 2400 12-31-64

TASK I - II

Four hundred ninety (490) kgs of plutonium were processed via the hood 7-C head make-up tank with an aqueous recycle of 4.13 percent. The on-line rate was 1897 grams of plutonium per hour, with a mechanical efficiency of 71 percent.

One button failed to meet product specifications due to low density. The average density of the acceptable buttons was 19.47 g/cc. Total impurities, as averaged on 123 of 219 buttons produced, was 822 ppm. Carbon averaged 219 ppm; Fe, Cr, and Ni averaged 177 ppm; Al, Cu, Si, and Sn averaged 24 ppm; and Mg averaged 250 ppm.

The average yield was 97.9 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 2.95 percent of charge.

CONTAMINATED WASTE RECOVERY FACILITY

General

Eighty-eight (88) boxes of packaged waste, nine packages of miscellaneous wastes, and two boxes of repackaged waste were processed. Ninety-nine (99) cans of ash, 29 batches of leach solution, 49 boxes of repackaged waste, and 14 batches of scrubber solution were produced. All processing operations were suspended on 12-24-64 and 12-25-64. An estimated plutonium material balance is as follows:

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<u>Input</u>		<u>Output</u>	
Waste boxes	7651 gms Pu	Ash	7221 gms Pu
Miscellaneous waste	553 gms Pu	Leach solutions	3626 gms Pu
Repackaged waste	98 gms Pu	Repackaged waste	699 gms Pu
		Scrubber solutions	83 gms Pu
	8302 gms Pu		11,629 gms Pu

Incinerator Operation

The incinerator was in use for approximately 138 hours during this period. Operation was generally satisfactory during the early part of the period. On 12-16-64 smoking at the incinerator entrance became excessive. The incinerator was cooled for cleaning and rodding of the vertical flues on 12-18-64 and 12-19-64. Several hood filters were also changed at this time. There was still some smoking following the cleaning. On 12-22-64 back-burning at the feed entrance started to occur and was intermittent before and after the holidays shut-down. On 12-28-64 an evaluation of the off-gas flow rate and the vacuum at various locations in the scrubber system indicated a probable restriction in the vicinity of the scrubber off-gas heater rather than in the incinerator itself. Incinerator operation was discontinued for the last three days of the year while the off-gas line was inspected.

The incinerator belt was changed on 12-16-64. On 12-27-64 the belt was jammed for a short time by a 1/2-inch nut which interfered with movement of the drive drum.

Scrubber Operation

Scrubber solution circulation pump failures occurred on 12-8-64 and 12-11-64. The first failure followed the same pattern that has been evident in other recent failures. Within 2 to 3 days following a scrubber solution pH of 2 - 4, failure of the pump occurs. The second failure does not appear to have followed the pattern.

In an effort to improve the vacuum on the incinerator, the scrubber was given a nitric acid flush on 12-16-64. This did not improve operation, however. On 12-22-64 the off-gas flow rate and scrubber inlet vacuum began to decrease to the extent that back-burning and smoking became more frequent. On 12-28-64 an excessive pressure drop existed in the vicinity of the scrubber off-gas heater. On 12-29-64, 12-30-64, and 12-31-64 the line from the scrubber to the heater was replaced following an inspection which revealed nearly complete pluggage of the line at the heater entrance and holes in several other locations. Samples of the scale have been submitted for laboratory examination.

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Scrubber Solution Pump Corrosion Studies

Addition of urea to the scrubber solution was discontinued between 12-20-64 and 12-28-64 when the supply ran out. During this time, the majority of the plastic found in the waste boxes was leached rather than burned.

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