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TITLE

Z PLANT WEEKLY REPORT
Recuplex, Incinerator, & Task I - II

January through December, 1962

AUTHOR

L. E. BRUNS,
R. Y. LYON, &
W. F. UNZICKER

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Z PLANT WEEKLY REPORT

Recuplex, Incinerator, & Task I - II

January through December, 1962

L. E. BRUNS, R. Y. LYON, & W. F. UNZICKER

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January 8, 1962

Z PLANT WEEKLY REPORT

Recuplex

No S & C runs were processed. The SE columns processed 12.1 kgs of laboratory-dissolved oxide, 16.1 kgs of Hood 42-dissolved oxide, and 5.4 kgs of Hood 43-dissolved metal.

The SE Hood processed 1440 liters per day at 89 percent operating efficiency, for an instantaneous rate of 1690 liters per day. Waste losses to the crib averaged 0.009 g/l (0.38 percent of the feed plutonium).

Incinerator

1-8-62

Replacement and tightening of the chopper blades was completed late in the week. A box of contaminated waste was introduced to the sorting hood on 1-5-62. Sorting and chopping of the combustible material was completed.

Task I - II

One hundred seventy-three kgs of plutonium were processed with an aqueous recycle of 2.5 percent. The average on-line rate was 1913 grams of plutonium per hour, with a mechanical efficiency of 83 percent.

Two buttons failed to meet density specifications. The average density of the others was 19.30 g/cc. Total impurities, as averaged on 36 of 75 buttons reported to date, was 837 ppm, including carbon at 238 ppm, Fe, Ni, and Cr at 125 ppm, and Al, Cu, Sn, and Si at 44 ppm.

Average yield was 95.7 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 5.2 percent of charge. The high loss is being attributed to air in-leakage to the hydrofluorinator. Production rates were reduced about 15 percent in order to reduce losses. In addition, the inlet hydrofluorinator temperature was reduced to 300° C from 350° C.

Visual inspection of the oxalic acid magnetic flowmeter, removed two weeks ago, revealed leakage had occurred through an electrode seal. The inspection also revealed that the vitreous enamel liner had disappeared from at least a short section of the tube.

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January 15, 1962

Z PLANT WEEKLY REPORT

Recuplex

The period for the data accumulation for this report has been changed from Monday through Sunday to Friday through Thursday, effective with this report. Consequently, this report only covers a four day period, January 8, 1962, through January 11, 1962, since the previous report covered through Sunday, January 7, 1962.

No slag and crucible runs were processed. The solvent extraction columns processed 13.5 kgs of laboratory-dissolved oxide, 12.6 kgs of Hood 41 and 42-dissolved oxide, and 5.2 kgs of continuously dissolved metal.

The solvent extraction hood processed 1920 liters per day at 93 percent operating efficiency, for an instantaneous rate of 2060 liters per day. Waste losses to the crib averaged 0.009 g/l (0.41 percent of the feed plutonium).

On Wednesday, January 10, 1962, at about 10:32 AM, fire broke out in the solvent extraction hood. The fire burned one plastic bag and three rubber gloves from the front panel before it was extinguished by carbon dioxide extinguishers wielded by operating personnel. Damage was limited to the destruction of the bag and gloves listed, and to a set of electrical wiring servicing the H-3 interface controller which later required replacement. The fire was started when hot welding slag fell on the plastic sleeve housing the welding cable. A bracket was being welded to the structural base of the H-2 column for use as a valve support.

Incinerator

The combustible contents of two waste boxes, containing a total of 78 grams of plutonium, were processed through the incinerator on 1-8-62 and 1-9-62. A total of 24 grams of plutonium (by neutron count) were collected in the ash. Analysis of the scrubber solution following the approximately four hours of incinerator operation produced the following results:

Plutonium In Solution	As Solid	Total Solids	pH	Cl^-
4.84^{-4} g/l	3.23^{-3} g/l	642.5 mg/l	12.4	0.012 M

This represents a total of 0.69 grams of plutonium in the scrubber solution.

Several rubber gloves and miscellaneous metal objects were leached in a nitric acid solution. Analytical results are not yet available. The contents of a vacuum cleaner bag, which contained approximately 45 grams of plutonium by neutron count, will also be dissolved in the leach pot in order to obtain a good overall material balance for the boxes processed to date.

Task I - II

Ninety-seven kgs of plutonium were processed with an aqueous recycle of 6.1 percent. The average on-line rate was 1886 grams Pu/hour with a mechanical efficiency of 91 percent.

All buttons met product specifications. The average density was 19.37 g/cc. Total impurities, as averaged on 30 of 40 buttons reported to date, was 611 ppm, including carbon at 174 ppm; Fe, Ni, and Cr at 76 ppm; and Al, Cu, Sn, and Si at 13 ppm.

Average yield was 96.5 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 2.74 percent of charge.

The feed flowmeter was placed in service after nitric acid was circulated through it for several hours, with apparently good flow measurement and control. After being placed in service, the flow measurement and control were erratic. The response of the controller was similar to what one would expect if the control system was periodically picking up stray current. The erratic operation is being investigated.

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January 22, 1962

Z PLANT WEEKLY REPORT

Recuplex

The columns were only run through Sunday, January 14, when they were scheduled to be shut down. This was done to tie in the new air pulser for the H-1 column and make piping changes to use the HF as an organic wash column, as originally intended. The above work was nearing completion at the end of Thursday, the end of the report period.

No S & C runs were processed. The solvent extraction columns processed 12.0 kgs of plutonium dissolved in the laboratory oxide dissolvers, 10.2 kgs from the Hood 41 and 42 dissolvers, and 3.6 kgs from the continuous dissolver.

The solvent extraction hood processed at an instantaneous rate of 1870 liters per day, but for only 39 percent of the week. The waste losses to the crib averaged 0.010 g/l, which was 0.30 percent of the feed plutonium.

Incinerator

1-22-62

Two waste cartons, containing a total of 141 grams of plutonium by neutron count, were processed during the week. Ash, containing 112 grams of plutonium by neutron count, was collected in addition to 16 grams of plutonium collected in the cyclone ash. One can of ash containing 83 grams of plutonium was transferred to the Development Laboratory for recovery studies.

The original scrubber solution was retained for operation during the week. Following approximately 12 hours total operation, the scrubber solution analyses were as follows:

	Pu Analysis		Total Pu in	Miscellaneous Analyses		
Volume	Solution	Solids	Scrubber	Cl	pH	Solids
160 liters	3.0×10^{-3} g/l	8.76×10^{-3} g/l	1.88 gms	0.517 M	10.5	0.868 g/l

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12262

Leaching operations were continued using hot nitric acid solution containing a small amount of ANN. Rubber gloves and other miscellaneous items were contacted in the leach pots. Sodium fluoride was added to the solutions following nitric acid contact, heated for one hour, and then killed with ANN. One 7.2 liter batch of 7.76 g Pu/liter solution is ready for transfer to an RC can. Another batch of approximately 7 liters of solution is being held in a leach pot for sampling and transfer to the head tank.

Task I - II

Twenty-six kgs of plutonium were processed with an aqueous recycle of 4.1 percent. The average on-line rate was 1868 grams Pu/hour, with a mechanical efficiency of 77.8 percent.

One button failed to meet density specifications. This button contained recycle powder from the hydrofluorinator off-gas filter. The average density was 19.30 g/cc. Total impurities, as averaged on eight buttons reported to date, was 1100, including carbon at 395 ppm; Fe, Ni, and Cr at 121 ppm; and Al, Cu, Sn, and Si at 21 ppm.

Average yield was 96.5 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 1.88 percent of charge.

Investigation of the feed control system revealed that the system is picking up stray electrical fields. Variations up to 35 percent of the range of the feed control system could be accomplished by making adjustments in the power to the calciner and hydrofluorinator heating elements. Several methods of correcting the trouble are being attempted.

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January 29, 1962

Z PLANT WEEKLY REPORT

Recuplex

No S & C runs were processed. The solvent extraction columns processed 2.2 kgs of plutonium dissolved in the laboratory oxide dissolvers, 2.2 kgs from Hood 42, and 0.9 kg from the continuous metal dissolver. The prototype teflon-lined oxide dissolver pot installed in Hood 42 is operating successfully and with a shorter "heat up" time. The solvent extraction hood processed 629 liters per day at 32 Percent operating efficiency, for an instantaneous rate of 1965 liters per day. Waste losses to the crib averaged 0.005 g/l (0.36 percent of the feed plutonium).

After a scheduled shut-down for prototype installations, the columns were started on January 20. The prototypes installed were (1) the air pulser, (2) improved piping on the HF column, and (3) two electrically operated ball valves in the HF piping system. The flowsheet was changed on the HF column from a sodium carbonate cap (initial tests) on the organic receiver tanks to an ANN cap. The first tests with Na_2CO_3 were successful for processing both CCW and SE floor material; however, extraction column distribution coefficients were not as high as could be realized if all the DBP were not removed. Hence, the change to the ANN cap. The ANN cap removes residual fluoride in the organic, but leaves the DBP.

The loss of operating efficiency was due to start-up problems on the air pulser and the HF column. The cam, cam follower, and poppet valve arrangement on the air pulser required maintenance. Experimental work was necessary to establish the optimum pulse conditions. With the ANN cap and processing floor material, the build-up of Pu.DBP was rapid, and PuF_4 precipitated in the HF column plugging outlet lines. The lines were flushed with ANN and cleared; however, after another day of operation, the system plugged again due to excessive DBP from the [illegible]ly full RB and SE floors. Despite the plugging troubles, the [illegible]d prevent the organic receiver tanks from excessive Pu [illegible] With the carbonate cap, or with a different fluoride strip [illegible]t is believed that the precipitate can be prevented.

Several leaks were discovered in the J-26 A steam stripper. This has been the trouble for the past few weeks. The stripper will need to be HF flushed and replaced.

Incinerator 12962

One waste carton, containing 160 grams of plutonium by neutron count, was processed during the week. Ash, containing 112 grams of plutonium by neutron count, was collected in addition to 14 grams of plutonium collected in the cyclone ash.

The scrubber solution resulting from approximately 12 hours of operation was dumped to the D-6 sump before processing was resumed. This was done to keep the chloride ion concentration and build-up of fly ash solids at a fairly low level during early operation. Plutonium sent to the sump amounted to 1.88 grams. New solution was made up for this week's operation.

Leaching operations were continued with rubber gloves and miscellaneous items being contacted in the leach pots. Two batches of solution from the previous week were transferred to an RC can. Approximately 12 liters of solution, resulting from the week's operation, is being held for sampling.

An approximate material balance on the boxes processed prior to the week covered in this report is as follows:

Removals

Receipts	Leach Solutions	Ash	Waste	Scrubber	Total Recovery
219 grams	103 grams	152 grams	6 grams	1.88 grams	262.88 grams

Task I - II

One hundred fifty-three kgs of plutonium were processed with an aqueous recycle of 3.7 percent. The average on-line rate was 1828 g Pu/hour, with a mechanical efficiency of 90.9 percent.

Two buttons failed to meet density specifications. Both buttons were from crucibles that had burnt PV lids. Spectroanalyses are pending. The average density on acceptable buttons was 19.33 g/cc. Total impurities, as averaged on 38 of 65 buttons reported to date, was 1068 ppm, including carbon at 275 ppm; Fe, Ni, and Cr at 167 ppm; and Al, Cu, Sn, and Si at 41 ppm.

Average yield was 96.7 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 0.77 percent of charge.

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February 5, 1962

Z PLANT WEEKLY REPORT

Recuplex

No skull and crucible runs were processed. The solvent extraction columns processed 3.4 kgs of plutonium dissolved in the laboratory oxide dissolvers, 4.3 kgs from Hood 42, and 2.0 kgs from the continuous metal dissolver. The solvent extraction columns operated at an instantaneous rate of 1750 liters per day, at an operating efficiency of 45 percent. Waste losses to the crib averaged 0.013 g/l and were 1.36 percent of the feed plutonium.

The poor operating efficiency was mainly attributed to H-1 pulser difficulties, HF column pluggage, and rework of floor material. The H-1 air pulser cam operated air supply and vent valves both stuck on one occasion. Later, the characteristics of the pulser changed, presumably due to the removal of some unknown restriction such that the pulser pushed the H-1 column over the top. Experimental work was necessary to re-establish the settings for satisfactory pulser operation. The HF column outlet pluggage was again due to precipitated PuF_4 caused by the necessary heavy rework of floor material. The HF column was bypassed in order to continue operation. However, this created high plutonium organic that necessitated further outages for treating the organic and contacting high waste. Flowsheet adjustments are being made to better handle the floor material.

Incinerator

2562

Two waste cartons, containing 186 grams of plutonium by neutron count, were processed during the week. Ash, containing 118 grams of plutonium by neutron count, was collected, in addition to 35 grams of plutonium collected in the cyclone ash.

The incinerator was in operation for 4.5 hours during the week. Scrubber solution resulting from this operation and three hours operation during the previous week contained approximately 4.23 grams of plutonium.

2562

Leaching operations were continued with rubber gloves, miscellaneous items, and powder from the boxes being contacted in the leach pots. One batch of solution from the previous week and two batches from current operation were transferred to RC cans. Approximately 11 liters of solution, resulting from the week's operation, are being held for further heating and sampling.

An approximate material balance on the boxes processed to date is as follows:

Receipts	Removals				
	Leach Solutions	Ash	Waste	Scrubber	Total Recovery
565 grams	453 g	431 g (175 g)	29 g	6.11 g	919.11 g (663.11 g)

The ash plutonium content, as measured by neutron counter, is listed on the upper line. The content, as estimated from laboratory analyses, is listed in parentheses. Preliminary recovery data from the 234-5 Development Laboratory tend to indicate that the laboratory analyses are more nearly correct. Further work will be carried on to confirm the findings.

Task I - II

One hundred thirteen kgs of plutonium were processed with an aqueous recycle of 4.6 percent. The average on-line rate was 1848 g Pu/hr., with a mechanical efficiency of 95.5 percent.

Three buttons were produced which failed to meet the density specification. One of the reductions resulted in a badly burned PV lid. One reduction charge was reported to possibly be short on chemicals. The third reduction resulted in flame spewing from the thermowell and scorching the hood panel. The cause of the phenomena has not been determined.

The average density of acceptable buttons was 19.30 g/cc. Total impurities averaged 1309 ppm on 18 of the 36 buttons produced. Carbon averaged 572 ppm; Fe, Ni, and Cr averaged 127 ppm; and Al, Cu, Si, and Su averaged 27 ppm. The average yield was 95.6 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 0.7 percent of charge.

The Pu^{240} content of the buttons produced averaged 6.21 percent.

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February 13, 1962

Z PLANT WEEKLY REPORT

Recuplex

No skull and crucible runs were processed. The solvent extraction columns processed 32.7 kgs of plutonium dissolved in the laboratory oxide dissolvers, 9.8 kgs from Hood 42, and 3.6 kgs from the continuous metal dissolver. The solvent extraction columns operated at an instantaneous rate of 2320 liters per day, at an operating efficiency of 89 percent. Waste losses to the crib averaged 0.006 g/l and were 0.33 percent of the feed plutonium.

Considerable floor material was processed through the HF column during the week. The high volume of floor material was believed to be the cause of the dark color observed in the H-2 column most of the week. Solvent extraction waste losses ran intermittently high and low most of the week, also. The high wastes were easily reduced by contacting with organic.

The HF column was out of service for one full day as the result of a leak in the nipple at the bottom of the column. The H-1 air pulser failed electrically, but caused only an hour and a half down time before it was restored to service.

Incinerator

Z 862

One complete and one partial waste carton, containing 98 grams of plutonium by neutron count, were processed during the week. Incinerator operation was discontinued on 2-7-62 due to jamming of the incinerator belt drive pulley, caused by a loose collar which allowed the pulley to shift to the side. Repairs to the pulley and to a broken wire on the incinerator belt were completed on 2-9-62. Ash containing 94 grams of plutonium by neutron count was collected.

The scrubber solution from the previous week, containing 4.23 grams of plutonium, was dumped to the D-6 tank on 2-5-62. Following 3.5 hours of incinerator operation during the week, the new scrubber solution contained approximately 1.6 grams of plutonium and 297 grams of solids. The solution was dumped to D-6 on 2-9-62.

286

Leaching operations were continued. One batch of solution from the previous week and two batches from current operation were transferred to RC cans.

An approximate material balance on the boxes processed to date is as follows:

Receipts	Removals				
	Leach Solutions	Ash	Waste	Scrubber	Total Recovery
663 grams	512 grams	525 grams (262 grams)	29 grams	7.69 grams	1073.69 grams (810.69 grams)

The figures in parentheses reflect the ash recovery based on laboratory analyses while the larger figures represent the recovery based on neutron count.

Task I - II

One hundred two kgs of plutonium were processed with an aqueous recycle of 3.5 percent. The average on-line rate was 1675 grams Pu/hr, with a mechanical efficiency of 83.3 percent.

All buttons met product specifications. The average density was 19.31 g/cc. Total impurities, as averaged on 27 of 49 buttons reported to date was 1157 ppm. Carbon averaged 530 ppm; Fe, Ni, and Cr averaged 163 ppm; and Al, Cu, Si, and Sn averaged 42 ppm. The average yield was 96.2 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 0.7 percent of charge.

The Pu^{240} content of the buttons produced averaged 6.13 percent, ranging from 5.83 and 6.33 percent.

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February 19, 1962

Z PLANT WEEKLY REPORT

Recuplex

Four slag and crucible plus powder and two clean-out runs were processed this week. The recovery was 113 percent of the "book" value. The solvent extraction columns processed 17.4 kgs from the Hood 41 and 42 oxide dissolvers, 6.9 kgs from the Analytical Laboratory oxide dissolvers, and 3.4 kgs from the continuous metal dissolvers.

The solvent extraction columns processed at an average instantaneous rate of 1990 liters per day at 71 percent operating efficiency. The waste losses to the crib averaged 0.008 g/l, which was 0.47 percent of the feed plutonium.

The H-2 column continued to operate with a darker color than normal most of the week. While the CAW stream plutonium loss was higher than normal most of the week, the CAW batches continued to be reduced fairly easily with organic contacts. The high volume of rework material from the hood floors is still believed to be the cause of the dark color in H-2 and the higher than normal CAW losses.

Nearly fifteen hours of down time was sustained due to necessary repairs to the H-1 interface controller. Most of the rest of the down time was also for equipment maintenance - several valve replacements, "A" feed rotameter repair, and rehook-up of the HF column.

The HF column is still being plagued with line pluggage. Development Laboratory assistance has been requested to help solve the problem.

Incinerator

21962

Three waste cartons, containing 236 grams of plutonium by neutron count, were processed during the week. The incinerator was in operation for 11 hours. Ash, containing 335 grams of plutonium by neutron count, was collected. The scrubber solution, containing 1.8 grams of plutonium resulting from 5.75 hours of operation, was dumped to D-6 on 2-15-62.

21962

Leaching operations were continued. Two batches of solution were transferred to RC cans.

During operation of the incinerator on 2-16-62, a nitrogen purge was substituted for the water spray at the entrance to the burning chamber. No backfires occurred, with a flow of 30 cubic feet of nitrogen per hour. The flow rate will be reduced on subsequent tests to find the optimum.

An approximate material balance on the boxes processed to date is as follows: (Figures in parentheses are laboratory analyses, while larger numbers represent recovery based on neutron count.)

Receipts	Removals				
	Leach Solutions	Ash	Waste	Scrubber	Total Recovery
899 grams	628 grams	860 grams (362 grams)	42 grams	9.51 grams	1539.51 grams (1041.51 grams)

Task I - II

Thirty-three kgs of plutonium were processed with an aqueous recycle of 3.4 percent. The average on-line rate was 1865 grams Pu/hour, with a mechanical efficiency of 90 percent.

One button failed to meet density specifications. The average density of acceptable buttons was 19.27 g/cc. Total impurities, as averaged on 9 of 13 buttons reported to date, was 705 ppm, not including carbon. No carbon analyses were reported. Fe, Ni, and Cr averaged 240 ppm, and Al, Cu, Si, and Sn averaged 43 ppm.

The average yield was 95.1 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 1.2 percent of charge.

The Pu^{240} content of the buttons produced averaged 6.00 percent, ranging from 5.87 to 6.14 percent.

The feed and oxalic acid flow transmitters were interchanged in an effort to eliminate the interference of stray electrical fields on the feed control system. The change appears to have been successful, however, more thorough checks will be made when the button line operations resume.

The indications are that the vacuum tube transmitter, previously installed in the oxalic acid control system, is much less susceptible to interference from stray electrical fields than the transistorized transmitter previously installed in the feed control system.

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February 27, 1962

Z PLANT WEEKLY REPORT

Recuplex

One slag and crucible and one clean-out run were processed this week. The solvent extraction columns processed 12.4 kgs from the Hood 41 and 42 oxide dissolvers, 2.3 kgs from the Analytical Laboratory oxide dissolvers, and 3.4 kgs from the continuous metal dissolver.

The solvent extraction columns processed at an average instantaneous rate of 1750 liters per day at 49 percent operating efficiency. The waste losses to the crib averaged 0.010 g/l, which was 0.70 percent of the feed plutonium. Production for the week was only 12.1 kgs compared to the previous week's 38.1 kgs. High waste losses in the column effluent waste stream were caused by a high proportionate volume of floor material being reworked. All of the waste batches had to be contacted with organic before they could be discarded. The high proportionate volume of floor material processed through the HF column was chiefly responsible for more pluggage problems in the effluent lines from the column. Larger effluent lines from this column may possibly reduce the problem. However, at present the HF column is not being used as intended, washing the organic effluent (CCW) from the H-3 column. The CCW is going directly to the K-1 and K-2 tanks, where it is being batch contacted.

During the week, the major equipment repairs or replacements were the H-1 column interface controller replacement, the H-1 column let-down valve replacement, and the K-9 pump was replaced. One bad "B" feed leak was repaired by removal of a bad pressure gage and capping off the line. Numerous smaller leaks were repaired by valve and line replacements. Some of the valves replaced were the #239 (K-9 to G-58), #706, #329, #317, #703, and #503. A number of back-flushes had to be made to free lines for proper flow.

On Thursday, 2-22-62, it was decided to clean the floors before processing more rich feeds. The condition of the floor is such that efficient solvent extraction is difficult. The "off standard" material from the floors appears to be a substance that is only partially soluble in TBP-CCl_4 but readily soluble in DBBP, perhaps some type of plasticized organic.

Incinerator

22062

Five waste cartons, containing 343 grams of plutonium by neutron count, were processed during the week. The incinerator was in operation for nine hours following removal of a short section of the incinerator belt. The belt had stretched enough that there was no take-up left at the floating end. Ash, containing 664 grams of plutonium by neutron count, was collected. The scrubber solution, containing 4.3 grams of plutonium resulting from 5.17 hours of operation, was dumped to D-6 on 2-19-62. It was again dumped to D-6 on 2-21-62, with 3.3 grams of plutonium resulting from 2.33 hours of operation.

Leaching operations were continued with two batches of solution being transferred to RC cans and one more ready to transfer.

The nitrogen purge at the entrance to the burning chamber was continued at a rate of 25 - 28 cubic feet per hour. Occasional back-burning was still evident.

An approximate material balance on the boxes processed to date is as follows: (Figures in parentheses are based on laboratory analyses, while the larger numbers represent recovery based on neutron count.)

	Removals				
Receipts	Leach Solutions	Ash	Waste	Scrubber	Total Recovery
1242 grams	751 grams	1524 grams (583 grams)	54 grams	17 grams	2346 grams (1405 grams)

Task I - II

Thirteen kgs of plutonium were processed with an aqueous recycle of 24 percent. The average on-line rate was 1258 grams Pu/hour, with a mechanical efficiency of 51 percent.

All buttons met specifications. The average density was 19.07 g/cc. Spectroanalysis results are not reported as yet.

Average yield was 95.5 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 0.85 percent of charge.

The operation was out of feed material most of the week.

Distribution:

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March 5, 1962

Z PLANT WEEKLY REPORT

Recuplex

No slag and crucible material was processed during the week. No rich feed was processed except Task I supernate concentrate. This was in accordance with the decision noted in the previous week's report to clean the floors before processing any more rich feed. The floor material is such that efficient solvent extraction is difficult.

The solvent extraction columns processed at an average instantaneous rate of 2110 liters per day at 43 percent operating efficiency. The waste losses to the crib were 2.51 percent of the feed plutonium. All of the waste batches had to be contacted with organic before they could be discarded. Necessary organic contacting of the waste batches and washing of the column organic was responsible for much of the down time.

The columns were shut down for 13 hours on 2-23-62 to replace the failed H-3 pulsing bellows. The previous H-3 bellows failure and replacement occurred on 10-5-61. A new H-3 interface controller was installed on 2-24-62, and was partly responsible for a 26-hour shut-down. The K-1 organic tank sampler failed and was partly responsible for a 19-hour shut-down on 2-26-62.

The CO column stripped the organic efficiently, but the plugged condition of the packing prevented continued use of the column. Floor material has plugged the column; and it will be necessary to replace the present packing, since flushes attempted do not free the packing sufficiently for good operation.

Incinerator

3562

Seven waste cartons, containing 272 grams of plutonium by neutron count, were processed during the week. The incinerator was in operation for 9.75 hours. Ash, containing 393 grams of plutonium by neutron count, was collected. The scrubber solution, containing 4.6 grams of plutonium resulting from 6.5 hours of operation, was dumped to D-6 on 2-26-62. It was again dumped on 2-28-62, with 2.4 grams of plutonium resulting from 3.33 hours of operation, and on 3-2-62, with 1.03 grams of plutonium resulting from 6.5 hours of operation.

[redacted]

3562

Leaching operations were continued with three batches of solution being transferred to RC cans and one more ready to transfer.

An approximate material balance on the boxes processed to date is as follows. (Figures in parentheses are based on laboratory analyses, while the larger numbers represent recovery based on neutron count.)

Receipts	Leach Solutions	Ash	Waste	Scrubber	Total Recovery
1514 grams	869 grams	1917 grams (700 grams estimated)	71 grams	25 grams	2882 grams (1665 grams)

Task I - II

Ninety-eight kgs of plutonium were processed with an aqueous recycle of 2.8 percent. The average on-line rate was 1641 grams Pu/hr, with a mechanical efficiency of 76.3 percent.

One button was rejected because of low density. The average density was 19.31 g/cc. Total impurities, as averaged on 21 of 42 buttons reported to date, was 1141 ppm. Carbon averaged 371 ppm; Fe, Ni, and Cr averaged 328 ppm; and Al, Cu, Si, and Sn averaged 40 ppm. The average yield was 96.8 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 0.8 percent of charge.

The Pu^{240} content of the buttons produced averaged 5.99 percent.

A test was started to determine the feasibility of recycling solutions of relatively high purity directly to Task I.

Six cans of solution from the laboratory oxide dissolvers were recycled directly to the button line for processing. Two cans were blended with 15 cans of feed from the parent plants. The average density of the 12 buttons produced from the blended feed was 19.33 g/cc. Spectrographic analyses of six of the 12 buttons indicated impurity levels comparable to buttons produced from normal feed from the parent plants.

Two buttons were produced from laboratory oxide dissolver solution processed with no blending. While the button spectrographic analyses are not available, the button densities were 19.33 g/cc and 19.39 g/cc.

The effect of increased calciner temperatures and air purge flow on button carbon content was tested. The calciner temperatures were increased to 400° C from 350° C and air purge flow to 0.7 cfm from 0.3 cfm. Samples of oxide, fluoride, calcium, and a button representative of standard and test conditions were analyzed for carbon. The results are tabulated below:

[redacted]

	Normal Conditions	Test Conditions
Calciner Temperature	350° C - 350° C - 350°C	400° C - 400° C - 400° C
Air purge flow	0.3 cfm	0.7 cfm
PuO_2	48,000 parts C pmp sample	5000 parts C pmp sample
PuF_4	220 parts C pmp sample	220 parts C pmp sample
Ca	Carbon not detected	Carbon not detected
Button	90 parts C pmp Pu	130 parts C pmp Pu

Distribution:

1. R. E. Tomlinson
2. L. M. Meeker - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

March 12, 1962

Z PLANT WEEKLY REPORT

Recuplex

No slag and crucible material was processed during the week. No rich feed was processed through the solvent extraction columns except for Task I supernate concentrate. The solvent extraction and reception and blending hood floors are still in the process of being cleaned up.

The solvent extraction columns processed at an average instantaneous rate of 2800 liters per day at 57 percent operating efficiency. The waste losses to the crib were 3.1 percent of the feed plutonium. All of the waste batches had to be contacted with organic before they could be discarded. Approximately half of the down time was taken up with washing of the column organic and organic contacting of the waste batches.

Approximately 16 hours of down time was caused by a leaking solvent extraction hood panel, necessitating decontamination work. Eight hours of down time on 3-7-62 was caused by failure of one and replacement of both cam followers on the H-1 air pulser. CO column plugging and valve and line repairs accounted for most of the balance of the down time.

Incinerator

Five waste cartons, containing 234 grams of plutonium by neutron count, were processed during the week. The incinerator was in operation for 11 hours. Ash, containing 373 grams of plutonium by neutron count, was collected. The scrubber solution, containing 0.9 grams of plutonium resulting from 8.25 hours of operation, was dumped to D-6 on 3-7-62.

On 3-5-62, approximately 250 ml of sludge collected from the Recuplex SE Hood floor were mixed with sawdust and processed through the incinerator on a trial basis. Combustion was satisfactory, with very little ash resulting.

Leaching operations were continued, with four batches of solution being transferred to RC cans and one more ready to transfer.

As part of a program to determine more closely the amount of plutonium in the incinerator ash, one-half of the contents of the can designated as A-22-2-10, containing 56 grams of plutonium by laboratory analysis and 212 grams by neutron package counter, was dissolved in a leach pot. Analysis of the resulting solution indicated 37.8 grams of plutonium present. The remainder of the ash will be dissolved as soon as possible. Any resulting sludge will be filtered by the 234-5 Development Laboratory to effect complete recovery.

During processing of waste from the SE Hood on 3-8-62, part of the gummy material was not chopped but was transferred directly to the feed bin. Apparently this material contained a few bolts and other metal objects which were not detected during sorting. One bolt became wedged in the incinerator belt and caused it to jam. During the ensuing unjamming procedure, a section of the already weakened belt failed. The belt was replaced on 3-9-62.

An approximate material balance on the boxes processed to date is as follows (figures in parentheses are based on laboratory analyses, while the larger numbers represent recovery based on neutron count):

Receipts	Leach Solutions	Ash	Waste	Scrubber	Total Recovery
1778 grams	1074 grams	2380 grams (770)	80 grams	26 grams	3560 grams (1950 grams)

Task I - II

One hundred forty-four kgs of plutonium were processed with an aqueous recycle of 7.8 percent. The average on-line rate was 1755 grams Pu/hr, with a mechanical efficiency of 96 percent.

Two buttons failed to meet the density specification. One of these buttons was reduced from a charge which included about 450 grams of powder from an unknown source. The average density of acceptable buttons was 19.31 g/cc. Total impurities, as averaged on 23 of 61 buttons produced, was 987 ppm. Carbon averaged 249 ppm; Fe, Ni, and Cr averaged 87 ppm; and Al, Cu, Si, and Sn averaged 10 ppm.

The average yield was 96.3 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 0.87 percent of charge.

The Pu^{240} content of the buttons produced averaged 5.98 percent.

Thirteen and five tenths (13.5) kgs of plutonium in skull oxide dissolver solution were blended with feed from the parent plants.

Distribution:

1. R. E. Tomlinson
2. L. M. Meeker - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

March 19, 1962

Z PLANT WEEKLY REPORT

Recuplex

No slag and crucible material was processed during the week. The solvent extraction and reception and blending hood floors are still in the process of being cleaned up. Seven and nine-tenths (7.9) kgs of plutonium were received from the vacuum header because of an inadvertent overloading of a tank in Task I. This was processed along with 9.1 kgs of Task I supernate concentrate. One and eight-tenths (1.8) kgs of plutonium were processed from the teflon-lined oxide dissolver in order to clear this dissolver for dissolving for direct Task I processing, using a reduced (0.25 M) fluoride content procedure. Task I has taken 43 kgs so far this month from the laboratory oxide dissolvers and successfully processed them.

The solvent extraction columns processed at an average instantaneous rate of 2550 liters per day at 58 percent operating efficiency. The waste losses to the crib were 1.4 percent of the feed plutonium. All of the waste batches had to be contacted with organic to reduce the plutonium content to within throw-away limits. The H-2 column continues to run quite dark in color from processing floor material containing black-colored solids. The dark colored solids or crud can easily be seen in the columns and have caused plugging problems in the aqueous waste effluent lines to the receiver tanks. Based on sampling data, the processing of floor material has reduced the number of extraction stages available in the columns by a factor of two.

The solvent extraction hood floor material plugged the suction leg used to remove the floor material to K-9 and was replaced by a 1-inch saran line. The floor has been flushed using 28 percent nitric acid - 32 percent ANN mixture, but there are still a great many solids remaining. The above mixture of nitric acid and ANN is also being introduced into the H-11 tank (aqueous intermediate tank between H-1 and H-2) via the CO column to help the salting strength and aid in dissolving the solids.

The H-1 prototype air pulser failed on 3-9-62 and was returned to service after the vent valve was replaced. About 3-1/2 hours were lost due to this failure. Most of the rest of the down time was sustained due to organic contacting of high waste, washing organic, and unplugging lines.

Incinerator

Seven waste cartons, containing 239 grams of plutonium by neutron count, were processed during the week. The incinerator was in operation for 11 hours. Ash, containing 616 grams of plutonium by neutron count, was collected. The scrubber solution, containing 1.50 grams of plutonium resulting from five hours of operation, was dumped to D-6 on 3-14-62.

Leaching operations were continued with five batches of solution being transferred to RC cans.

Dissolution of the remainder of the can of ash designated as A-22-2-10 was completed. The sludge was filtered in the 234-5 Development Laboratory. The resulting residue was boiled in 10 M HNO_3 and 0.2 M HF for one hour and then filtered again. The complete recovery and a comparison with laboratory and package counter values is listed below:

Content, based on laboratory analysis		56 grams
Content, based on package counter		212 grams
Recovery of first half of can	37.8 grams	
Recovery of second half of can	27.0 grams	
Development Lab. filtrate	4.56 grams	
Development Lab. boiled-out filtrate	5.15 grams	
Final residue	1.94 grams	
TOTAL RECOVERY		76.45 grams

Further recovery tests will be made on several other cans.

As an additional method of determining the plutonium content of the incinerator ash, all ash cans produced prior to 3-15-62, with the exception of the one can dissolved on a test basis, were surveyed with the transistorized 400 channel analyzer. Data obtained will be correlated with laboratory analyses, package counter results, and, in a few cases, with actual dissolution and recovery of the ash.

An approximate material balance on the boxes processed to date is as follows. Figures in parentheses are based on laboratory analyses, while the larger numbers represent recovery based on neutron count.

Receipts	Leach Solutions	Ash	Waste	Scrubber	Total Recovery
2017 grams	1189 grams	2784 grams (891 grams)	104 grams	30 grams	4107 grams (2214 grams)

Task I - II

Sixty-two and one-half (62-1/2) kgs of plutonium were processed with an aqueous recycle of 8.9 percent. The average on-line rate was 1459 grams of plutonium per hour, with a mechanical efficiency of 89 percent.

All buttons met specifications, however, one button from the previous week's production had a burnt PV lid and was out of specification due to high impurities, especially iron.

The average density was 19.24 g/cc. Total impurities, as averaged on 18 of 22 buttons produced, was 1018 ppm. Carbon averaged 409 ppm; Fe, Ni, and Cr averaged 139 ppm; and Al, Cu, Si, and Sn averaged 58 ppm.

The average yield was 95.9 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 1.5 percent of charge.

The Pu^{240} content of the buttons produced averaged 6.00 percent.

Thirteen kgs of plutonium skull oxide dissolver solution were blended with feed from the parent plants.

Distribution:

1. R. E. Tomlinson
2. L. M. Meeker - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

March 27, 1962

Z PLANT WEEKLY REPORT

Recuplex

The solvent extraction and reception and blending hood floors are still in the process of being cleaned. The two ends of the solvent extraction hood were free of floor solids at the end of the report period. The low portion of the hood floor is in the middle of the hood, and this portion still contains some solids. The end of the solvent extraction hood floor clean-up is in sight.

No slag and crucible material was processed. One and five-tenths (1.5) kgs of Task I supernate concentrate and a teflon-lined dissolver clean-out were processed through the solvent extraction columns.

The solvent extraction columns processed at an average instantaneous rate of 1450 liters per day at 27 percent operating efficiency. The waste losses to the crib were 12.5 percent of the feed plutonium. All of the waste batches had to be contacted with organic to reduce the plutonium content to within throw-away limits. Much of the week's work consisted of washing the organic and contacting high waste batches. Processing of floor material through the SE system continued to plug lines and reduce mass transfer efficiency in the columns. A column flush will be necessary before efficient solvent extraction processing can be accomplished.

One waste batch (number 35) slightly exceeded the batch limit when "B" feed flow to the columns failed, resulting in low salting strength. This batch was reworked.

The laboratory oxide dissolver in Hood 4 pressured on 3-19-62 when the condenser became plugged, causing the shut-down of the laboratory oxide dissolver for the rest of the week.

Approximately 6 kgs of teflon-lined oxide dissolver solution (0.25 M fluoride) were blended with laboratory oxide dissolver solution in Task I and processed successfully.

Incinerator

One waste carton, containing 12 grams of plutonium by neutron count, was processed during the week. Ash, containing 84 grams of plutonium by neutron count, was collected as the result of 1.5 hours of incinerator operation and a thorough clean-out of the incinerator hoods. The scrubber solution containing 2.96 grams of plutonium, resulting from 7.8 hours of operation, was dumped to D-6 on 3-19-62. It was also dumped on 3-20-62 following 1.5 hours of operation, with 3.4 grams of plutonium being discarded.

Incinerator operation was discontinued on 3-19-62 to allow replacement of the chopper blades. During the down time the scrubber system was flushed with 10% nitric acid to clean out the rotameters and any solids accumulated in the tank and tower. Some leaks developed in the scrubber piping, with a slight spread of contamination in the scrubber cell. Clean-up was in progress at the end of the week.

An approximate material balance on the boxes processed to date is as follows. Figures in parentheses are based on laboratory analyses, while the larger numbers represent recovery based on neutron count.

Receipts	Leach Solutions	Ash	Waste	Scrubber	Total Recovery
2029 grams	1215 grams	2868 grams (918 grams)	113 grams	35 grams	4231 grams (2281 grams)

Task I - II

Forty-three kgs of plutonium were processed with an aqueous recycle of 5.5 percent. The average on-line rate was 840 grams of plutonium per hour, with a mechanical efficiency of 66 percent.

Two buttons failed to meet density specifications. The average density of the acceptable buttons was 19.18 g/cc. Total impurities, as averaged on 10 out of 18 buttons produced, was 1083 ppm. Carbon averaged 370 ppm; Fe, Ni, and Cr averaged 171 ppm; and Al, Cu, Si, and Sn averaged 141 ppm. The great increase in this last group of impurities was attributed to the addition of aluminum which was added for test purposes. Al averaged 112 ppm. The average yield was 91.9 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 10 percent of charge.

The Pu^{240} content of the buttons produced averaged 6.24 percent. The Pu^{240} content of buttons produced during the period from 2-7-62 to 3-16-62 was corrected. The average Pu^{240} content of all buttons produced during this period was 6.13 percent, an increase of 0.14 absolute percent. Forty kgs of plutonium skull oxide dissolver solution were used as feed.

Distribution:

1. R. E. Tomlinson
2. L. M. Meeker - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

April 2, 1962

Z PLANT WEEKLY REPORT

Recuplex

The remaining solids on the floor of the solvent extraction hood were removed by the end of the report period. The final clean-up was accomplished while one of the hood panels was off for replacement and maintenance work. This is the first time the solvent extraction hood floor has been completely cleaned up in approximately two and one-half years. It is planned to process out the material in the facility tanks and then flush the system to remove accumulated solids before returning to normal processing. It is planned to provide a coarse filter vessel before completing the receiving and blending hood floor clean-up in order to reduce the solids content of the floor material before reworking.

No slag and crucible material was processed. Three and seven tenths (3.7) kgs of Task I supernate concentrate were processed through the solvent extraction columns.

The solvent extraction columns processed at an average instantaneous rate of 3040 liters per day at 24 percent operating efficiency. The waste losses to the crib were 1.0 percent of the feed plutonium. (This number is low because of a correction for an over-statement for last week.) All of the waste had to be contacted with organic to reduce the plutonium content to within throw-away limits. Down time had to be taken for contacting high waste batches and washing organic. Plugged lines continued to plague operations, such as the J-6 weight factor line, K-2 to K-9 decant line, and floor to K-9 line.

The teflon-lined oxide dissolver (M-1) solution (0.25 M fluoride) mentioned last week as blended with laboratory oxide dissolver solution in Task I and processed successfully, was found to be too high in impurities. Stainless steel corrosion products were quite high. Wet iron analysis of the dissolver solution averaged approximately 40,000 parts of iron per million parts of plutonium, with proportionately high chromium and nickel found in the emission spectrograph shots. A leak was discovered on the M-1 dissolver this week and the teflon lining was observed as being wrinkled. The leak was on the bottom flange weld. For the test for direct Task I processing, the dissolving time was increased from three to six hours. Since the hot plate surface temperature easily reaches 600° F, which exceeds the 400° F maximum

recommended temperature for teflon, it is postulated that the increased dissolving time permitted the dissolver metal skin to reach higher temperatures, damaging the teflon lining. Inspection of the dissolver is planned when it is removed.

Incinerator

Five waste cartons, containing 417 grams of plutonium by neutron count, were processed during the week. Ash containing 913 grams of plutonium by neutron count was collected as the result of 11 hours of incinerator operation. The scrubber solution, containing approximately 30.6 grams of plutonium, resulting from 8.5 hours of operation, was dumped to D-6 on 3-29-62.

Leaching operations were continued, with three batches of solution being transferred to RC cans.

During the week's operation, the incinerator primary inlet air supply was not used, in an effort to determine the effect on back-burning at the incinerator inlet. No fires occurred. The off-gas scrubber analysis increased by a factor of 10 during this period. Reasons for the sudden increase are being investigated.

An approximate material balance on the boxes processed to date is as follows. Figures in parentheses are based on laboratory analyses, while the larger numbers represent recovery based on neutron count.

Receipts	Leach Solutions	Ash	Waste	Scrubber	Total Recovery
2446 grams	1299 grams	3781 grams (1202 grams)	124 grams	65 grams	5269 grams (2690 grams)

Task I - II

Sixty-one kgs of plutonium were processed, with an aqueous recycle of 9.1 percent. The average on-line rate was 1511 grams of Pu/hour, with a mechanical efficiency of 73 percent.

Five buttons failed to meet density specifications. The average density of the acceptable buttons was 19.26 g/cc. Total impurities, as averaged on three of 19 buttons produced, was 631 ppm. Carbon averaged 235 ppm; Fe, Ni, and Cr averaged 192 ppm; and Al, Cu, Si, and Sn averaged 25 ppm.

The average yield was 96.5 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 1.33 percent of charge.

The testing of recycling skull oxide dissolver solution directly to Task I was completed. The test results will be reported when complete data are available.

Distribution:

1. R. E. Tomlinson
2. L. M. Meeker - W. F. Unsicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

May 21, 1962

Z PLANT WEEKLY REPORT

INCINERATOR

Period 4-2-62 through 4-29-62

Waste recovery operations during the week of 4-2-62 through 4-8-62 were confined to the sorting and leaching hoods. The chopper was dismantled for replacement of the blades and screen.

Dissolution of a can of cyclone ash designated as A-22-1-4C, containing 16 grams of plutonium by neutron package counter, 7.54 grams by laboratory analysis, and 14 grams by 380 KEV gamma count, was initiated on 4-6-62. This is a continuation of the program to determine more closely the amount of plutonium in the incinerator ash.

Week of 4-30-62 through 5-4-62

Four waste cartons, containing 358 grams of plutonium by neutron count, were processed during the week. Ash, containing 728 grams of plutonium by neutron count, was collected as the result of 5.25 hours of incinerator operation.

During the early part of the week, the chopper was reassembled, and the incinerator belt housing in the ash collection hood was regasketted. The grating in the ash discharge assembly was removed to decrease the possibility of a build-up of ash.

The incinerator was operated with no primary inlet air to determine the effect on back-burning at the incinerator chamber entrance. Preliminary information would tend to indicate an increase in the amount of carbon and plutonium carried over to the scrubber.

An approximate material balance on the boxes processed to date is as follows. Figures in parentheses are based on laboratory analyses, while the larger numbers represent recovery based on neutron count.

Receipts	Leach Solution	Ash	Waste	Scrubber	Total Recovery
2804 grams	1305 grams	4517 grams (1623 grams)	132 grams	118 grams	6072 grams (3178 grams)

Week of 5-7-62 through 5-13-62

There was no operation of the incinerator or leach hood during the week, due to questionable scrubber solution analyses and other questions pertaining to load-out of leach hood solutions. A meeting of representatives from Analytical Control, Research and Engineering Process Chemistry, and Research and Engineering Finished Products Chemical Technology on 5-9-62 resulted in a request for Process Chemistry to develop a procedure for producing accurate reliable analyses of the scrubber solution. The problem stems from the varying amounts of carbonaceous-plutonium-bearing solids of varying particle sizes in the solution.

Recuplex (Week ending 4-5-62)

The solvent extraction hood floor clean-up was completed on 3-30-62 while one of the hood panels was removed. The panel was replaced, clean-up operations completed, and processing out tank inventories started at 5:45 PM on 3-31-62 in preparation for extensive system flushing. The reception and blending hood floor clean-up will be accomplished with a special solids filtering system to be used after normal processing is resumed.

No slag and crucible material was processed. Nine and 3/10 (9.3) kgs of Task I supernate concentrate were processed through the solvent extraction columns.

The solvent extraction columns processed at an average instantaneous rate of 2440 liters per day at 41 percent operating efficiency. The waste losses to the crib were 1.1 percent of the feed plutonium. Most of the waste batches had to be contacted with organic to reduce the plutonium content to within throw-away limits. However, the waste effluent stream (CAW) plutonium content was approaching pre-clean-up levels again at the end of the report period. During the solvent extraction hood floor clean-up period, the CAW's were in the 0.1 to 0.2 g/l plutonium range routinely, whereas during normal operations they were approximately 0.01 g/l.

The teflon liner in the teflon-lined oxide dissolver (M-1) failed at the end of the previous report period, with the consequent loading of the dissolver solution with stainless steel corrosion products. This failure was the cause of unsuccessful processing of teflon-lined dissolver solution in Task I contrary to what was reported the last week. The failure of the teflon-lined dissolver is attributed to

the longer dissolving period, 6 vice 3 hours, and the fact that the hot plate used to heat the dissolver attains greater than 400° F surface temperature, which is the maximum recommended for teflon. The liner failure was at the bottom flange, which was in contact with the hot plate.

The K-9 pump failed on 3-30-62. It was removed, repaired, and reinstalled. The "A" feed rotometer failed on 4-2-62 and was replaced on 4-3-62. The organic (CAX) rotometer developed a leak on 4-4-62, was removed, repaired, and reinstalled on 4-5-62.

TASK I - II (Week ending 4-8-62)

Seventy-five kgs of plutonium were processed with an aqueous recycle of 12.5 percent. The average on-line rate was 2014 grams of Pu/hour, with a mechanical efficiency of 74 percent.

One button failed to meet density specifications. The average density of the acceptable buttons was 19.32 g/cc. Total impurities, as averaged on 17 of 33 buttons, were 1262 ppm. Carbon averaged 353 ppm; Fe, Ni, and Cr averaged 213 ppm; and Al, Cu, Si, and Sn averaged 30 ppm.

The average yield was 96.7 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 0.82 percent of charge.

Distribution:

1. R. E. Tomlinson
2. L. M. Meeker - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

May 28, 1962

Z PLANT WEEKLY REPORT

Recuplex

Nothing to report.

Incinerator

A study of the sampling and analytical procedures pertaining to the scrubber solutions was completed by Process Chemistry with the following recommendations resulting:

1. Obtain two 30 ml samples for duplicate plutonium determinations on both the solid and liquid phases.

2. The laboratory will utilize all of the sample submitted.

3. A third 30 ml sample will be obtained for other analyses, including pH, Cl^-, and total solids.

The 234-5 Development Laboratory is continuing studies pertaining to removal of solids from the scrubber solutions. Coagulation and settling are being studied at present.

The scrubber solution resulting from five hours of incinerator operation on 5-3-62 and containing 32 grams of plutonium was sampled at four different levels on 5-23-62. Analyses down to a level three inches from the bottom indicated 0.001 gm Pu/liter, with no solids visible. The clear liquid was decanted to the D-6 tank by using the tank vacuum sampler and a movable decant leg. Approximately 150 liters of solution were transferred. The remaining solids were slurried into an RC can for future recovery.

Task I - II

Sixty-nine kgs of plutonium were processed with an aqueous recycle of 12.3 percent. The average on-line rate was 720 grams of Pu/hour, with a mechanical efficiency of 84.4 percent.

Six buttons failed to meet specifications, four on impurity and two had low density. The average density of the acceptable buttons was 19.18 g/cc. Total impurities, as averaged on 21 of 22 buttons produced, was 1705 ppm. Fe, Ni, and Cr averaged 389 ppm; Al, Cu, Si, and Sn averaged 19 ppm; and carbon averaged 492 ppm.

The average yield was 95.9 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 0.65 percent of charge.

During the first week of operation of the RMC button line, with filtrate load-out into SN cans, the filtrate to feed volume ratio was 11.2. The utilization of 11.2 SN cans per feed PR can is about twice that expected under flowsheet conditions.

An investigation revealed the excess filtrate rate could be accounted for by the cake wash rate, excess oxalic acid flow to the precipitator, and a higher than expected $KMnO_4$ flow to the FKT (filtrate kill tank). The excess oxalic acid flow to the precipitator was caused by a feed flow indication higher than the actual flow. Since the oxalic acid flow to the precipitator is automatically controlled by the indicated feed flow, an excess oxalic acid flow resulted. The excess oxalic acid accounts for the higher than expected $KMnO_4$ addition rate to FKT. After a new feed pump was installed on 5-25-62, the indicated feed flow was correct and the oxalic acid excess was reduced. The cake wash was eliminated in an effort to further reduce the filtrate generation rate. Elimination of the cake wash does not appear to have affected button purity.

Following the correction of the feed flow indication and elimination of the cake wash, the SN can/PR can ratio dropped to 5.5 on 5-26-62 and 5-27-62. The average plutonium concentration in the filtrate increased to 6.4 g/l from 3.4 g/l, however.

In an effort to determine the feasibility of disposing filtrate from the vacuum drum filter to the ground, a routine sampling of the unkilled filtrate was started. Of the nine samples taken, five analyzed less than 0.03 grams soluble Pu/liter, and the other four ranged from 0.3 to 7.7 grams soluble Pu/liter.

Distribution:

1. R. E. Tomlinson
2. L. M. Meeker - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

June 4, 1962

Z PLANT WEEKLY REPORT

Recuplex

No information to report.

Incinerator

Reinstallation of the incinerator primary inlet air supply distributor was completed. This distributor supplies air up to a point approximately four feet inside the incinerator. It had not been in use since start-up of "hot" operation. Primary inlet air has been supplied through a connection close to the burning chamber inlet. The distributor was reinstalled in an effort to improve combustion and better utilize the nitrogen purge to reduce back-burning at the entrance.

Task I - II

Ninety-four and one-half (94½) kgs of plutonium were processed, with an aqueous recycle of 14.4 percent. The average on-line rate was 942 grams of Pu/hour, with a mechanical efficiency of 63 percent. The ratio of SN cans filled to PR cans processed was 6.7:1. The average SN concentration was 5.4 g Pu/l.

Three buttons failed to meet density specifications. The average density of the acceptable buttons was 19.15 g/cc. Total impurities, as averaged on 35 of 38 buttons produced, was 1367 ppm. Carbon averaged 524 ppm; Fe, Ni, and Cr averaged 220 ppm; and Al, Cu, Si, and Sn averaged 57 ppm.

The average yield was 96.2 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 0.47 percent of charge.

Distribution:

1. R. E. Tomlinson
2. L. M. Meeker - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

June 20, 1962

Z PLANT WEEKLY REPORT

No report for Recuplex or Incineration.

Task I - II - Period Ending 6-7-62

One hundred fifty-one kgs of plutonium were processed with an aqueous recycle of 7.1 percent. The average on-line rate was 1073 grams Pu/hr and the mechanical efficiency was 86 percent. The ratio of Sn cans filled to PR cans processed was 5.3:1. The average Sn concentration was 3.3 grams Pu/liter.

Three buttons failed to meet impurity specifications and five failed to meet the density specifications. The average density of acceptable buttons was 19.25 g/cc. Total impurities averaged 1890 ppm, including 712 ppm carbon. Fe, Ni, and Cr averaged 115 ppm; and Al, Cu, Si, and Sn averaged 33 ppm. Reduction yields averaged 96 percent; and the loss to slag and crucible, as measured by neutron counter, was 0.5 percent.

Two PR cans of Redox nitrate, containing 150,000 - 250,000 ppm Bi, were blended with Purex nitrate and processed. The bismuth content of the buttons produced from this feed ranged from 10 to more than 1000 ppm. While no reject buttons could be attributed to the presence of bismuth, the presence of bismuth appears to have reduced the average button density.

The calciner off-gas scrubber system plugged frequently in the inlet arm and the overflow line, and is scheduled to be removed.

The vitreous enamel-lined feed flowmeter was removed and a teflon-lined flowmeter installed. Initial operation of the new flowmeter has been satisfactory.

Period Ending 6-14-62

One hundred twenty-five kgs of plutonium were processed with an aqueous recycle of 4.2 percent. The average on-line rate was 1254 g Pu/hr,

with a mechanical efficiency of 59 percent. The ratio of Sn cans filled to FR cans processed was 4.8:1. The average Sn concentration was 2.2 g Pu/l.

Eight buttons failed to meet specifications, six on density and two because of high impurities. The average density of the acceptable buttons produced was 19.23 g/cc. Total impurities, as averaged on 42 of 57 buttons produced, was 1206 ppm. Carbon averaged 532 ppm; Fe, Ni, and Cr averaged 148 ppm; and Al, Cu, Si, and Sn averaged 27 ppm.

The average yield was 95.72 percent. Reduction loss to slag and crucible, as measured by the neutron counter was 0.80 percent of charge.

Distribution:

1. R. E. Tomlinson
2. L. M. Meeker - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

Z PLANT WEEKLY REPORT

No report this week for Recuplex or the Incinerator.

Task I - II

One hundred fifteen kgs of plutonium were processed with an aqueous recycle of 3.06 percent. The average on-line rate was 1163 grams of plutonium per hour, with a mechanical efficiency of 87.5 percent. The ratio of Sn cans filled to PR cans processed was 5.5:1. The average Sn concentration was 1.4 grams plutonium per liter.

Thirteen buttons failed to meet specifications. Eleven failed because of density and two because of high impurities. The average density of the acceptable buttons produced was 19.20 g/cc. Total impurities, as averaged on 32 of 52 buttons produced, was 1241 ppm. Fe, Ni, and Cr averaged 372 ppm; carbon averaged 405 ppm; and Al, Cu, Si, and Sn averaged 69 ppm.

The average yield was 95.1 percent. Reduction loss to slag and crucible as measured by the neutron counter was 0.92 percent of charge.

Distribution:

1. R. E. Tomlinson
2. L. M. Meeker - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

July 2, 1962

Z PLANT WEEKLY REPORT

No report for Recuplex.

INCINERATOR

Week of 6-4-62 through 6-10-62

The scrubber cell caustic circulation pump failed early in the week and was replaced with a spare unit. Other miscellaneous maintenance and clean-up items were also completed.

Four waste cartons, containing 106 grams of plutonium by neutron count, were processed during the week. Ash, containing 118 grams of plutonium by neutron count, was collected as the result of approximately six hours of incinerator operation. The scrubber solution, containing 6.79 grams of plutonium, resulting from approximately two hours of operation, was drained to D-6 on 6-9-62. Leaching operations were continued, with one batch of leach solution being transferred to an RC can.

An approximate material balance on the boxes processed to date is as follows. Figures in parentheses are based on laboratory analyses, while the larger numbers represent recovery based on neutron count. Neutron count of the ash will reflect a reduction in value due to a change in the orientation and geometry of the counting chamber. This was effective June 1, 1962.

Receipts	Leach Solutions	Ash	Waste	Scrubber	Total Recovery
2910 grams	1336 grams	4635 grams (1500 grams)	141 grams	128 grams	6240 grams (3105 grams)

Week of 6-11-62 through 6-17-62

Three waste cartons, containing 334 grams of plutonium by neutron count, were processed during the week. Ash, containing 74 grams of plutonium by neutron count, was collected as the result of 6.25 hours of incinerator

operation. The scrubber solution, containing 9.92 grams of plutonium, resulting from approximately four hours of operation, was drained to D-6 on 6-11-62.

Leaching operations were continued with four batches of leach solution being transferred to RC cans.

Incinerator operation during the present month is based on recommendations resulting from an Incinerator Task Force Meeting on May 23, 1962:

1. Maintain incinerator temperature at 800° C.
2. Do not burn plastics or rubber.
3. Operate at two inches water vacuum on the incinerator.
4. Use nitrogen to prevent back-burning.
5. Operate incinerator belt at 12 inches per minute.

An approximate material balance on the boxes processed to date is as follows. Figures in parentheses are based on laboratory analyses, while the larger numbers represent recovery based on neutron count.

Receipts	Leach Solutions	Ash	Waste	Scrubber	Total Recovery
3244 grams	1410 grams	4709 grams (1560 grams)	183 grams	138 grams	6440 grams (3291 grams)

Week of 6-18-62 through 6-24-62

Five waste cartons, containing 416 grams of plutonium by neutron count, were processed during the week. Ash, containing 124 grams by neutron count, was collected as the result of 17 hours of incinerator operation. The scrubber solution containing 11 grams of plutonium, resulting from 16.5 hours of operation, was drained to D-6 on 6-21-62. Another batch, containing 9.5 grams of plutonium, resulting from 6.75 hours of operation, was drained to D-6 on 6-24-62. Incinerator operation was discontinued early on 6-24-62 when a leak in the scrubber solution circulation piping contaminated the scrubber cell.

Leaching operations were continued with six batches of solution being transferred to RC cans. Much of the leaching involved asbestos and fiber glass hood air filters. Several problems in handling and drying remain to be solved.

An approximate material balance on the boxes processed to date is as follows. Figures in parentheses are based on laboratory analyses, while the larger numbers represent recovery based on neutron count.

Receipts	Leach Solutions	Ash	Waste	Scrubber	Total Recovery
3660 grams	1592 grams	4833 grams (1712 grams)	225 grams	158 grams	6808 grams (3687 grams)

Week of 6-25-62 through 7-1-62

There was no incinerator or leach hood operation during the week due to use of manpower for clean-up of the scrubber cell following the spread of contamination on 6-24-62.

TASK I - II

One hundred sixty-six kgs of plutonium were processed with an aqueous recycle of 3.9 percent. The average on-line rate was 1387 grams of plutonium per hour, with a mechanical efficiency of 85 percent. The ratio of Sn cans filled to PR cans processed was 4.6:1. The average Sn concentration was 2.1 grams plutonium per liter.

Fourteen buttons failed to meet specifications, all on low density. The average density of the acceptable buttons was 19.28 g/cc. Total impurities, as averaged on 56 of 72 buttons produced was 1601 ppm, including 965 ppm average carbon. Fe, Ni, and Cr averaged 255 ppm; while Al, Cu, Si, and Sn averaged 12 ppm.

The average yield was 95.3 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 0.90 percent of charge.

In an effort to determine the cause of "burned" pressure vessel lids, which frequently result in density reject buttons, a series of reduction charge samples were taken. The reduction charges which produced a good button and a "burned" lid are being thoroughly analyzed to determine significant differences between the charge compositions.

In an effort to determine the cause of density rejects in which "burned" lids were not reported, two reject buttons are being analyzed spectrographically and metallographically. The buttons were sampled externally, cut into four pieces, and sampled internally. The pieces are being sent to Plutonium Metallurgy Operation for metallographic analyses.

Variations in the HF and oxygen flow to the hydrofluorinator, and increased reduction charge mixing time were performed in an effort to reduce the button density reject rate. None of the changes helped.

The reduction charge weight was reduced about 15 percent in an effort to reduce the number of reject buttons produced.

Distribution:

1. R. E. Tomlinson
2. L. M. Meeker - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

July 9, 1962

Z PLANT WEEKLY REPORT

Recuplex - No report.

Incinerator

There was no operation during the early part of the week due to decontamination work in the scrubber cell. Leaching and burning operations were resumed on 7-7-62. One waste carton and one incinerator waste box were processed during the week. The incinerator was operated for 4.75 hours. Leaching operations were mainly involved with cleaning of air filters from the incinerator waste box. One batch of solution was transferred to an RC can.

Task I - II

One hundred fifty-nine kgs of plutonium were processed, with an aqueous recycle of 4.2 percent. The average on-line rate was 1295 grams of plutonium per hour, with a mechanical efficiency of 85.5 percent. The ratio of Sn cans filled to PR cans processed was 5.5:1. The average Sn concentration was 1.9 grams plutonium per liter.

Six buttons failed to meet specifications, two because of impurities and four because of low densities. The average density of the acceptable buttons produced was 19.28 g/cc. Total impurities as averaged on 76 of 82 buttons produced was 1297 ppm. Carbon averaged 256 ppm; Fe, Cr, and Ni averaged 232 ppm; and Al, Cu, Sn, and S averaged 11 ppm.

The average yield was 95.7 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 0.75 percent of charge.

Distribution:

1. R. E. Tomlinson
2. L. M. Meeker - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

July 16, 1962

Z-PLANT WEEKLY REPORT

RECUPLEX - No report.

INCINERATOR

One waste carton, containing 42 grams of plutonium, was completely processed during the week; and one carton, containing 170 grams of plutonium, was partially processed. Ash, containing 217 grams of plutonium by neutron count, was collected as the result of eight hours of incinerator operation during the past two weeks. The incinerator was operated for 3.25 hours during this week.

Leach hood operations were maintained throughout the week, with six batches of solution, involving 49.5 liters and 98.4 grams of plutonium being transferred to RC cans for storage. Leaching operations were mainly involved with filters, plastic, and rubber gloves.

An approximate material balance on the boxes processed to date is as follows: Figures in parentheses are based on laboratory analyses, while the larger numbers represent recovery based on neutron count.

Receipts	Leach Solutions	Ash	Waste	Scrubber	Total Recovery
3932 grams	1716 grams	5050 grams (1762 grams)	235 grams	167 grams	7168 grams (3880 grams)

TASK I - II

One hundred one kgs of plutonium were processed, with an aqueous recycle of 2.8 percent. The average on-line rate was 1100 grams of plutonium per hour, with a mechanical efficiency of 89.3 percent. The ratio of Sn cans filled to FR cans processed was 6.4:1. The average Sn concentration was 1.1 grams Pu/liter.

All buttons met specifications. The average density was 19.25 g/cc. Total impurities, as averaged on 49 of 53 buttons processed, was 1685, including carbon, which averaged 403 ppm. Fe, Ni, and Cr averaged 146 ppm; and Al, Cu, Si, and Sn averaged 45 ppm.

The average yield was 96.3 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 0.67 percent of charge.

Distribution:

1. R. E. Tomlinson
2. L. M. Meeker - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

July 23, 1962

Z PLANT WEEKLY REPORT

RECUPLEX - No report.

INCINERATOR

Two waste cartons, containing 197 grams of plutonium, were completely processed during the week, and the partial container from the previous week was also completed. Ash, containing 247 grams of plutonium by neutron count, was collected as the result of 6.5 hours of incinerator operation. The scrubber solution, containing 8 grams of plutonium, resulting from 1.5 hours of operation, was drained to D-6 on 7-18-62.

Leaching operations were continued with three batches of solution, involving 28.5 liters and 25 grams of plutonium being transferred to RC cans for storage. Leaching operations were mainly involved with plastic and rubber gloves. As a result of a meeting on leaching facilities, held on July 19, 1962, the recommendation was made that the burning of plastics be resumed.

An approximate material balance on the boxes processed to date is as follows:

Receipts	Leach Solutions	Ash	Waste	Scrubber	Total Recovery
4129 grams	1741 grams	* 5297 grams ** 1965 grams	277 grams	176 grams	* 7491 grams ** 4159 grams

* Neutron count. ** Laboratory analysis.

TASK I - II

One hundred forty-one kgs of plutonium were processed, with an aqueous recycle of 1.8 percent. The average on-line rate was 1215 grams of plutonium per hour, with a mechanical efficiency of 81 percent. The ratio of Sn cans filled to PR cans processed was 5.5:1. The average Sn concentration was 0.82 grams of plutonium per liter.

All buttons met specifications. The average density was 19.20 g/cc. Total impurities, as averaged on 58 of 74 buttons produced, was 1059 ppm, excluding carbon. Carbon averaged 276 on five button results. Fe, Ni, and Cr averaged 181 ppm; Al, Cu, Si, and Sn averaged 17 ppm; and Mg averaged 807 ppm.

The average yield was 96.0 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 0.8 percent of charge.

The analysis of two density reject buttons produced in June has been completed. External and internal samples of one of the buttons analyzed > 5000 ppm iron. The original analysis of a sample taken from the bottom of the button was 164 ppm iron. The second button was selectively examined by density determinations, X-Ray diffraction, metallography, hardness, and spectrographic analysis. The results clearly show a large degree of segregation from the top of the button to the bottom of the button. The metal at the bottom of the button was high purity alpha, while the metal at the top of the button consisted of beta and delta retained phases. The beta stabilizing element is believed to be magnesium, and the delta stabilizing element is believed to be silicon.

Distribution:

1. R. E. Tomlinson
2. L. M. Meeker - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

August 6, 1962

Z-PLANT WEEKLY REPORT

Recuplex - No report.

Incinerator - Week of 7-23-62 through 7-29-62

Six waste cartons, containing 433 grams of plutonium by neutron count, were processed during the week. Ash, containing 187 grams of plutonium by neutron count, was collected as the result of 13 hours of incinerator operation. The scrubber solution, containing 5.9 grams of plutonium resulting from 6.5 hours of incinerator operation, was drained to D-6 on 7-24-62. Another batch, containing 2.5 grams of plutonium resulting from 9.5 hours of incinerator operation, was drained to D-6 on 7-28-62. Burning of plastics was resumed.

The differential pressure across the 24" x 24" filter in the scrubber off-gas system increased to 4.5 inches of water on 7-25-62, resulting in low incinerator vacuum. The incinerator was operated for 5 hours with the small 12" x 12" auxiliary filter in use on 7-25-62 and 7-26-62. The large filter was changed on 7-27-62 after 145 hours of operation.

Leaching operations were continued with one batch of solution, involving 13.1 liters and 35 grams of plutonium being transferred to an RC can for storage.

An apparent loss of plutonium within the incinerator system, based on material balance, appears to be due to questionable neutron counter results on boxes of oily rags from the 231 Building. A thorough clean-out of the system failed to produce the required amount.

An approximate material balance on the boxes processed to date is as follows:

Receipts	Leach Solutions	Ash	Waste	Scrubber	Total Recovery
4562 grams	1776 grams	*5484 grams **2151 grams	282 grams	184 grams	*7726 grams **4393 grams

* Neutron count. ** Laboratory analysis.

Incinerator - Week of 7-30-62 through 8-5-62

There was no operation of the incinerator during the week. Weak spots in the belt were noted early on 7-30-62. Replacement of the belt was started on 7-31-62. Difficulties were encountered with the new belt which resulted in not being able to move the belt. The replacement belt is not constructed exactly the same as the previous belts, although it has not been proven that this is the problem. Investigation of the problem is still under way.

Two waste boxes were partially processed during the week with the leachable material being handled. Ash, containing 120 grams of plutonium by neutron count, was collected as the result of 2.5 hours of incinerator operation during the previous week. The scrubber solution, containing 4.3 grams of plutonium resulting from 3.5 hours of incinerator operation, was drained to D-6 on 8-2-62.

Task I - II - Week of 7-20-62 through 7-26-62

Eighty-five kgs of plutonium were processed with an aqueous recycle of 2.1 percent. The average on-line rate was 1232 grams of plutonium per hour, with a mechanical efficiency of 84 percent. The ratio of Sn cans filled to PR cans processed was 4.9:1. The average concentration was 1.09 grams of plutonium per liter.

All buttons met specifications. The average density was 19.19 g/cc. Total impurities, as averaged on 41 of 45 buttons produced, was 1259 ppm, including 604 ppm carbon. Fe, Ni, and Cr averaged 110 ppm; Al, Cu, Si, and Sn averaged 49 ppm; and Mg averaged 410 ppm.

The average yield was 96.6 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 0.43 percent of charge.

Task I - II - Week of 7-27-62 through 8-2-62

One hundred seventy-four kgs of plutonium were processed with an aqueous recycle of 2.2 percent. (One batch was 0.8 percent, and the other 165 batches were 1.4 percent.) The average on-line rate was 1169 grams of plutonium per hour, with a mechanical efficiency of 90.8 percent. The ratio of Sn cans filled to PR cans processed was 5.7:1. The average Sn concentration was 0.62 grams of plutonium per liter, except one high batch which was 60 grams per liter.

Six buttons failed to meet density specifications. The average density of the acceptable buttons produced was 19.17 g/cc. Total impurities, as averaged on 87 of 95 buttons produced, was 1281 ppm. Carbon averaged 575 ppm; Fe, Ni, and Cr averaged 130 ppm; Al, Cu, Si, and Sn averaged 80 ppm; and Mg averaged 344 ppm.

The average yield was 97.0 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 0.7 percent of charge.

The button reported last week as being a density reject, due probably to magnesium and silicon, was remelted to an ingot. The ingot density was 18.1, compared to the original button density of 18.40. The ingot spectrographic analysis revealed no cause for the low density. The ingot was sent to Plutonium Metallurgy Operation for examination.

Distribution:

1. R. E. Tomlinson
2. L. M. Meeker - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

August 13, 1962

Z PLANT WEEKLY REPORT

Recuplex - No report.

Incinerator

There was no incinerator operation during the week. Removal and modification of the jammed wire mesh belt was in progress. The belt was too wide, and it was necessary to shorten the link wires.

Task I - II

One hundred sixty-three kgs of plutonium were processed, with an aqueous recycle of 3.4 percent. The average on-line rate was 1109 grams of plutonium per hour, with a mechanical efficiency of 92.2 percent. The ratio of Sn cans filled to PR cans processed was 6:1. The average Sn concentration was 1.4, including one high batch which was 44 grams per liter.

Four buttons failed to meet density specifications. The average density of the acceptable buttons produced was 19.13 g/cc. Total impurities, as averaged on 80 of 84 buttons produced, was 1055 ppm. Carbon averaged 422 ppm; Fe, Cr, and Ni averaged 117 ppm; Al, Cu, Sn, and Si averaged 77 ppm; and Mg averaged 354 ppm.

The average yield was 98.2 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 1.0 percent of charge.

A test was performed to determine how button density and purity is affected by the ANN added to oxide dissolver solution.

The average density of seven buttons produced from Purex nitrate was 19.35 g/cc. The average density of 12 buttons produced from two feed batches containing 86 percent Purex nitrate and 14 percent oxide dissolver solution to which ANN had been added was 19.24 g/cc. The average density of 14 buttons produced from two feed batches containing 87 percent Purex nitrate and 13 percent ANN free oxide dissolver solution was 19.32 g/cc. Spectrographic analyses of the buttons are not complete.

Distribution:

1. R. E. Tomlinson
2. R. J. Sloat - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

August 27, 1962

Z PLANT WEEKLY REPORT

Recuplex - Shut down.

Incinerator - No report at this time.

Task I - II (Week Ending 8-16-62)

One hundred two kgs of plutonium were processed with an aqueous recycle of 4.4 percent. The average on-line rate was 900 grams Pu/hour, with a mechanical efficiency of 91.7 percent. The ratio of SN cans filled to PR cans processed was 7.5:1. The average SN concentration was 1.5 grams Pu/liter.

Two buttons failed to meet the density specifications. The average density of the acceptable buttons was 19.23 g/cc. Total impurities averaged 1124 ppm. Carbon averaged 488 ppm; Fe, Ni, and Cr averaged 98 ppm; Al, Cu, Si, and Sn averaged 65 ppm; and magnesium averaged 320 ppm.

The average yield was 97.5 percent. Reduction loss to slag and crucible averaged 0.6 percent of charge.

Skull oxide dissolver solution made up 30 percent of the total feed processed. Six buttons were produced from 100 Percent skull oxide dissolver solution to which no AMN had been added for complexing the fluoride ion. The average density of the six buttons was 19.35 g/cc.

Task I - II (Week Ending 8-23-62)

Not in operation.

[redacted]

Distribution:

1. R. E. Tomlinson
2. R. J. Sloat - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

Week Ending 8-30-62

Z PLANT WEEKLY REPORT

Task I and II

Twenty-three kgs of Pu were processed with an aqueous recycle of 18.2 percent. The reason for this real high aqueous recycle was attributed to the passage of Pu oxlate persipitate passed the drum cloth. The drum clothwas replaced three times and now appears to be operating satisfactorly. The average on line rate was 664 grams of Pu/hour with a mechanical efficiency of 59 percent. The ratio of Sn Cans filled to PR C_2ns processed was 11.5:1. The average Sn concentration was 4.1 grams per liter.

All buttons met specifications. The average density was 19.31 grams/cc. Total impurities was 1226 ppm. Carbon average was 445 ppm. Fe, Ni and Cr averaged 333 ppm; and Al, Cu, Si and Sn averaged 10 ppm.

The average yield was 99.6 percent. Reduction loss to slag and crucible, as measured by the neutron counter was 2.6 percent of charge.

[redacted]

[redacted]

HW-72224 RD

Distribution:

1. R. E. Tomlinson
2. R. J. Sloat - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

September 24, 1962

Z PLANT WEEKLY REPORT

RECUPLEX and INCINERATOR - No report.

TASK I - II (Week ending 9-6-62)

Sixty kgs of plutonium were processed with an aqueous recycle of 23.4 percent. The passage of the oxalate precipitate through the filter cloth caused this high loss. This was corrected by replacing the filter cloth and correcting a faulty installation. The average on-line rate was 837 grams Pu/hour, with a mechanical efficiency of 54 percent. The ratio of Sn cans filled to PR cans processed was 11.2:1. The average Sn concentration was 5.2 grams Pu/liter.

All buttons met specifications. The average density was 19.23 g/cc. Total impurities averaged 1081 ppm. Carbon averaged 291 ppm; Fe, Cr, and Ni averaged 280 ppm; Al, Cu, Sn, and Si averaged 43 ppm; Magnesium averaged 361 ppm.

Average yield was 97.8 percent. Reduction loss to slag and crucible, as measured by the neutron counter, averaged 0.8 percent of charge.

(Week ending 9-13-62)

Sixty-one kgs of plutonium were processed with an aqueous recycle of 11.4 percent. The average on-line rate was 680 grams Pu/hour, with a mechanical efficiency of 71 percent. The ratio of Sn cans filled to PR cans processed was 12.4:1. The average Sn concentration was 2.3 grams Pu/liter.

Two buttons made from recycled green powder, reported to be good powder, were out of specifications on both density and impurities. The average density of the acceptable buttons was 19.14 g/cc. Total impurities averaged 1334 ppm; carbon averaged 324 ppm; Fe, Cr, and Ni averaged 265 ppm; Al, Cu, Si, and Sn averaged 40 ppm; and magnesium averaged 517 ppm.

The average yield was 98.8 percent. Reduction loss to slag and crucible, as measured by the neutron counter, averaged 1.05 percent of charge.

[redacted]

TASK I - II (Week Ending 9-13-62 - Continued)

The teflon-lined oxalic acid magnetic flowmeter failed and was replaced with a glass-lined magnetic flowmeter. The teflon-lined flowmeter will be inspected in an effort to determine the cause of the failure.

(Week ending 9-20-62)

One hundred forty-nine kgs of plutonium were processed with an aqueous recycle of 8.7 percent. The average on-line rate was 1508 grams of Pu/hour, with a mechanical efficiency of 68 percent. The ratio of Sn cans filled to PR cans processed was 6.3:1. The average Sn concentration was 3.4 grams of Pu/liter.

Three buttons failed to meet density specifications. The average density of the acceptable buttons was 19.35 g/cc. Total impurities, as averaged on 34 of 61 buttons produced, was 1193 ppm. Carbon averaged 363 ppm; Fe, Cr, and Ni averaged 157 ppm; Al, Cu, Si, and Sn averaged 40 ppm; and magnesium averaged 445 ppm.

The average yield was 98.78 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 0.70 percent of charge.

Distribution:

1. R. E. Tomlinson
2. R. J. Sloat - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

October 22, 1962

Z PLANT WEEKLY REPORT

Task I - II (Only)

Week Ending 9-27-62

Twenty-eight kgs of plutonium were processed with an aqueous recycle of 10.1 percent. The average on-line rate was 1401 grams of plutonium per hour, with a mechanical efficiency of 29 percent. The ratio of Sn cans filled to PR cans processed was 8.7:1. The average Sn concentration was 2.9 grams Pu/liter.

All buttons met specifications. The average density was 19.18 g/cc. Total impurities, as averaged on six buttons, was 832 ppm. Carbon averaged 320 ppm; Fe, Cr, and Ni averaged 286 ppm; Al, Cu, Sn, and Si averaged 19 ppm; and Mg averaged 130 ppm.

The average yield was 89.3 percent, one yield being only 31.9 percent, while the remainder averaged 95.6 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 12.6 percent of charge. Excluding the one bad yield, it averaged 6.4 percent of charge.

Week Ending 10-4-62

Seventy-seven kgs of plutonium were processed with an aqueous recycle of 5.1 percent. The average on-line rate was 1354 grams of plutonium per hour, with a mechanical efficiency of 59 percent.

The ratio of Sn cans filled to PR cans processed was 6.8:1. The average Sn concentration was 1.9 grams of Pu/liter.

Ten buttons were rejects due to low density and high Fe, Cr, and Ni impurities. The high impurities are believed to be due to calciner corrosion caused by operating at temperatures in excess of 600° C, more than 200° C above the normal operating temperature, for about 24 hours. The high temperature was caused by the failure of two temperature recording instruments to indicate temperatures above the normal operating temperatures.

The average density of the acceptable buttons was 19.13 g/cc. Total impurities of the acceptable buttons, as averaged on 15 of 24 buttons produced was 2273 ppm. Carbon averaged 253 ppm; Fe, Cr, and Ni averaged 1273 ppm; Al, Cu, Si, and Sn averaged 38 ppm; and Mg averaged 563 ppm.

The average yield was 96.58 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 3.2 percent of charge.

Week Ending 10-11-62

Eighty-five kgs of plutonium were processed with an aqueous recycle of 4.8 percent. The average on-line rate was 1148 grams of plutonium per hour, with a mechanical efficiency of 60 percent. The ratio of Sn cans filled to PR cans processed was 8.9:1. The average Sn concentration was 1.3 grams of Pu/liter.

Three buttons failed to meet specifications because of low density. The average density of the acceptable buttons was 19.19 g/cc. The total impurities, as averaged on 31 of 38 buttons produced, was 1369 ppm. Carbon averaged 535 ppm; Fe, Cr, and Ni averaged 406 ppm; Al, Cu, Si, and Sn averaged 37 ppm; and Mg averaged 369 ppm.

The average yield was 98.14 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 2.0 percent of charge.

Week Ending 10-18-62

One hundred six kgs of plutonium were processed with an aqueous recycle of 2.4 percent. The average on-line rate was 1204 grams of plutonium per hour, with a mechanical efficiency of 79 percent. The ratio of Sn cans filled to PR cans processed was 5.9:1. The average Sn concentration was 1.0 grams Pu/liter.

One button failed to meet product specifications due to low density. The average density of the acceptable buttons was 19.32 g/cc. Total impurities, as averaged on 18 of 58 buttons produced, was 1040 ppm. Carbon averaged 284 ppm; Fe, Cr, and Ni averaged 416 ppm; Al, Cu, Si, and Sn averaged 70 ppm; and Mg averaged 264 ppm.

The average yield was 99.29 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 0.83 percent of charge.

Seven percent of the plutonium processed was from skull oxide dissolver solution.

Distribution:

1. R. E. Tomlinson
2. R. J. Sloat - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

Z PLANT WEEKLY REPORT

TASK I AND II

Week Ending 10-25-62

Eighty-eight kgs of plutonium were processed, with an aqueous recycle of 2.4 percent. The average on-line rate was 1485 grams of plutonium per hour, with a mechanical efficiency of 50 percent. The ratio of Sn cans filled to PR cans processed was 6:1. The average Sn concentration was 1.0 gram plutonium per liter.

All buttons met product specifications. The average density was 19.32 g/cc. Total impurities, as averaged on 34 of 42 buttons produced was 1099 ppm. Carbon averaged 388 ppm; Fe, Cr, and Ni averaged 206 ppm; Al, Cu, Si, and Sn averaged 20 ppm; and Mg averaged 368 ppm.

The average yield was 99.45 percent, except for one reduction that was only 32 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 2.8 percent of charge.

Seven percent of the plutonium processed was from skull oxide dissolver solution.

Week Ending 11-1-62

Hood 4b STARTED (Ion Exchange)

One hundred thirty-five kgs were processed with an aqueous recycle estimated to be 3.2 percent. The aqueous recycle solution is going to the ion exchange columns where the plutonium is extracted and held up until the column is loaded. By color of the resin, it was estimated that we have one full column ready for elution, or about 2300 grams of plutonium. The average on-line rate was 1690 grams of plutonium per hour, with a mechanical efficiency of 76 percent. Of the Sn canned out, the average concentration was 1.46 grams of plutonium per liter.

One button failed to meet density specifications. The average density of the acceptable buttons was 19.33 g/cc. Total impurities, as averaged on 19 of 64 buttons produced, was 814 ppm. Carbon averaged 324 ppm; Fe, Cr, and Ni averaged 83 ppm; Al, Cu, Si, and Sn averaged 48 ppm; and Mg averaged 350 ppm.

The average yield was 97.1 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 3.3 percent of charge.

Distribution:

1. R. E. Tomlinson
2. R. J. Sloat - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

December 3, 1962

Z PLANT WEEKLY REPORT

Task I - II

Week Ending 11-8-62

One hundred twelve kgs of plutonium were processed with an aqueous recycle of 3.5 percent. The average on-line rate was 1377 grams of plutonium per hour, with a mechanical efficiency of 81 percent. The ratio of Sn cans filled to PR cans processed was 5.3:1. The average Sn concentration was 1.7 grams plutonium per liter.

All buttons met product specifications. The average density was 19.38 g/cc. Total impurities, as averaged on 19 of 50 buttons processed was 1868 ppm. Carbon averaged 256 ppm; Fe, Cr, and Ni averaged 193 ppm; Al, Cu, Si, and Sn averaged 74 ppm; and Mg averaged 1184 ppm.

The average yield was 99.6 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 1.66 percent of charge.

Week Ending 11-15-62

One hundred eighty-six kgs of plutonium were processed with an aqueous recycle of about 5.8 percent. The aqueous recycle solution was going to the ion exchange columns part of the week, and the amount of plutonium held up in the columns had to be estimated by the color of the resin. The average on-line rate was 1323 grams of plutonium per hour, with a mechanical efficiency of 88 percent. The concentration of the Sn solution that was canned out was 3.7 grams plutonium per liter.

Four buttons failed to meet product specifications. Two failed on low density and two on impurities. One of these rejects was filter case powder. The average density of the acceptable buttons was 19.39 g/cc. Total impurities, as averaged on 60 of 79 buttons processed was 1553 ppm. Carbon averaged 228 ppm; Fe, Cr, and Ni averaged 219 ppm; Al, Cu, Si, and Sn averaged 37 ppm; and Mg averaged 819 ppm.

The average yield was 99.86 percent. Reduction loss to slag and crucible was 1.23 percent of charge.

Week Ending 11-22-62

One hundred twenty-three kgs of plutonium were processed with an aqueous recycle of 3.25 percent and ion exchange waste at 0.04 percent. The average concentration of the product eluted from ion exchange was 44.9 grams plutonium per liter. The average concentration of the ion exchange waste ran 0.015 grams plutonium per liter. The average on-line rate was 1435 grams of plutonium per hour, with a mechanical efficiency of 77 per cent.

Eight buttons failed to meet product specifications due to low density. The average density of the acceptable buttons was 19.32 g/cc. Total impurities, as averaged on 18 of 50 buttons produced, was 881 ppm. Carbon averaged 179 ppm; Fe, Cr, and Ni averaged 261 ppm; Al, Cu, Si, and Sn averaged 21 ppm; and Mg averaged 234 ppm.

The average yield was 100.9 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 1.7 percent of charge.

Week Ending 11-29-62

One hundred sixty-two kgs of plutonium were processed with an aqueous recycle of 4.3 percent and ion exchange waste at 0.003 percent. The average concentration of the product eluted from ion exchange was 36.5 grams of plutonium per liter. The average concentration of the ion exchange waste was 0.006 grams of plutonium per liter. The average on-line rate was 1631 grams of plutonium per hour, with a mechanical efficiency of 64 percent.

Five buttons failed to meet product specifications due to low density. The average density of the acceptable buttons was 19.37 g/cc. Total impurities, as averaged on 19 of 63 buttons produced, was 993 ppm. Carbon averaged 227 ppm; Fe, Cr, and Ni averaged 214 ppm; Al, Cu, Si, and Sn averaged 26 ppm; and Mg averaged 327 ppm.

The average yield was 99.5 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 1.7 percent of charge.

[redacted]

Distribution:

1. R. E. Tomlinson
2. R. J. Sloat - W. F. Unzicker
   L. E. Bruns
3. W. J. Gartin - J. J. Courtney

December 10, 1962

Z PLANT WEEKLY REPORT

TASK I - II

Week Ending 12-6-62

Seventy-four kgs of plutonium were processed with a button line aqueous recycle of 12.3 percent and ion exchange wastes at 0.046 percent. The average concentration of the product eluted from ion exchange was 39.8 grams plutonium per liter. The average concentration of the ion exchange waste was 0.018 grams plutonium per liter. The average on-line rate was 1181 grams of plutonium per hour, with a mechanical efficiency of 62 percent.

One button was rejected because it failed to meet product specifications on density. The average density of the acceptable buttons was 19.26 g/cc. Total impurities on these buttons is pending lab results.

The average yield was 99.42 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 2.1 percent of charge.

[redacted]

[redacted]

Distribution:

1. R. E. Tomlinson
2. R. J.Sloat - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

December 17, 1962

Z PLANT WEEKLY REPORT

Task I and II

Week Ending 12-13-62

One hundred forty-eight kgs of plutonium were processed, with a button line aqueous recycle of 10.1 percent and ion exchange waste running to 0.05 percent. The average concentration of the product eluted from ion exchange was 48.3 grams of plutonium per liter. The average concentration of the ion exchange waste was 0.009 grams of plutonium per liter. The average on-line rate was 1473 grams of plutonium per hour, with a mechanical efficiency of 62 percent.

One button failed to meet product specifications due to low density. The average density of the acceptable buttons was 19.29 g/cc. Total impurities, as averaged on 51 of 72 buttons produced, was 1022 ppm. Carbon averaged 239 ppm; Fe, Cr, and Ni averaged 156 ppm; Al, Cu, Si, and Sn averaged 42 ppm; and Mg averaged 448 ppm.

The average yield was 98.90 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 1.63 percent.

[redacted]

Distribution:

1. R. E. Tomlinson
2. R. J. Sloat - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

December 26, 1962

Z PLANT WEEKLY REPORT

TASK I - II

Week Ending 12-20-62

Two hundred eighteen kgs of plutonium were processed with a button line aqueous recycle of 1.6 percent and ion exchange waste running at 0.0003 percent. The average concentration of the product eluted from ion exchange was 35.5 grams of plutonium per liter. The average concentration of the ion exchange waste was 0.007 grams of plutonium per liter. The average on-line rate was 1957 grams of plutonium per hour, with a mechanical efficiency of 72 percent.

Two buttons failed to meet product specifications due to low density. The average density of the acceptable buttons was 19.34 g/cc. Total impurities, as averaged on 66 of 106 buttons produced, was 962 ppm. Carbon averaged 289 ppm; Fe, Cr, and Ni averaged 117 ppm; Al, Cu, Si, and Sn averaged 16 ppm; and Mg averaged 356 ppm.

Average yield was 98.37 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 3.5 percent of charge.

[redacted]

Distribution:

1. R. E. Tomlinson
2. R. J. Sloat - W. F. Unzicker - L. E. Bruns
3. W. J. Gartin - J. J. Courtney

December 31, 1962

Z PLANT WEEKLY REPORT

TASK I and II

Week Ending 12-27-62

One hundred thirty-three kgs of plutonium were processed with a button line aqueous recycle of 3.2 percent and ion exchange waste running at 0.07 percent. Average concentration of the product eluted from ion exchange was 52.3 grams of plutonium per liter. The average concentration of ion exchange waste was 0.012 grams of plutonium per liter. The average on-line rate was 1686 grams of plutonium per hour, with a mechanical efficiency of 66 percent.

All buttons met product specifications. The average density was 19.36 g/cc. Total impurities, as averaged on 43 of 64 buttons produced, was 1162 ppm. Carbon averaged 132 ppm; Fe, Cr, and Ni averaged 117 ppm; Al, Cu, Si, and Sn averaged 72 ppm; and Mg averaged 595 ppm.

Average yield was 100.16 percent. Reduction loss to slag and crucible, as measured by the neutron counter, was 1.4 percent of charge.

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