NOTICE

**CERTAIN DATA
CONTAINED IN THIS
DOCUMENT MAY BE
DIFFICULT TO READ
IN MICROFICHE
PRODUCTS.**

DECLASSIFIED

HW--12086-A

DE91 005388

FILE HW-12086-A

Route List

1. ~~W. F. McGhee~~
2. ~~W. F. McGhee~~ 1999
3.
4.
5.

DATE January 14, 1949

SUBJECT P Division Monthly Report -

December 1948

To File

FROM E. P. Leo

Copy

H. P. McCue

BEFORE READING THIS DOCUMENT, SIGN AND DATE BELOW:

DEC 2 6 1964

W. C. C. C.	1-21-49
H. H. H.	1-24-49
T. H. H.	1-27-49
E. H. H.	1-27-49
M. H. H.	1-27-49
C. H. H.	1-27-49
J. H. H.	1-28-49
M. H. H.	1-28-49
S. H. H.	1-31-49
D. H. H.	1-31-49
J. H. H.	2-5-49

DISTRIBUTION OF THIS DOCUMENT

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

DECLASSIFIED

DECLASSIFIED

#1 through #10 - [REDACTED]
#17 - E. P. Lee
#18 - R. O. Mahann
#19 - P. E. Lowe
#20 - W. P. McCue
#21 - W. W. Windshelmer
#22 - A. B. Greninger
#23 - 300 File
#24 - 700 File

Classification Cancelled (Change to

Declassified

By Authority of RLO-LG-4

12/27/90

11/27/90
PM Eick 11-27-90

HW-12086-A

P DIVISION

DECEMBER, 1948

January 14, 1949

This Document consists of

I. GENERAL

All piles operated at 275 M. W. throughout the month except for the outages listed under Area activities in this report.

An unscheduled power outage occurred in the 300 Area on December 2. The outage was a result of overloaded transmission lines and lasted from 4:45 p.m. until 8:45 p.m. No difficulties were encountered except for the lost operating time.

A total of 103 tons of metal was discharged from the piles during the month.

Operating schedules in the 300 Area were reduced from a six-day week to a five-day week on December 20 because of the favorable status of the inventory of canned slugs. All processes are now working one shift a day except Canning and Machining which work two shifts a day.

II. ORGANIZATION AND PERSONNEL

Number of Employees on Payroll - December
Beginning of Month: 372
End of Month: 374
Net Increase: 2

Seven operators were hired and one terminated voluntarily. Twenty-four operators were transferred to the 100 Areas for training in anticipation of the startup of H pile. Three operators were transferred to the S Division, and one was removed from the payroll due to illness. Seven operators from the 100 Area group were assigned to the construction liaison group to assist in following construction checking at the 100-DR pile, effective December 20.

The following changes in monthly personnel took place during the month:

R. W. Hooper was promoted to Shift Supervisor effective December 1 and assigned to 100-F Area.

G. Bunker, Shift Supervisor in 300 Area, was transferred to 100-F Area on December 8.

R. G. Swift, Shift Supervisor in the 300 Area, was transferred to 100-F Area on December 13.

MASTER

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

Due to film deterioration, portions of this document may be illegible.

FWL 11-40

DECLASSIFIED

P Division

III. AREA ACTIVITIES

<u>PILE SUMMARY</u>	<u>PILE B</u>	<u>PILE D</u>	<u>PILE F</u>
Time Operated (%)	92.3	86.5	89.8
Operating Efficiency (%)	91.8	84.3	87.4
*Power Level (M.W.)	275	275	275
*Inlet Water Temperature (°C)	4.3	4.8	4.8
*Outlet Water Temperature (Maximum °C, 10 tubes, 0.240" zone)	47.4	47.5	49.6
Number of Scrams	0	1	1
Number of Purges	2	1	2
Helium Consumption (cu. ft.)	56,675	67,704	75,666
Metal Discharged (tons)	36.12	26.35	40.55
**Inhours Gained (this month)	4	(-)2	(-)7
*Inhours Poisoned	280	443	402
*Inhours in Rods	62	60	38

* Month end figures.

** Does not include increased reactivity due to CO₂ in gas system.PILE BUILDINGOutage Breakdown

<u>Date of Outage</u>	<u>Scheduled</u>	<u>Length of</u>
<u>Metal Discharged</u>	<u>Maintenance</u>	<u>Outage (Hours)</u>
12/1	D	21.8
12/6	F	23.2
12/7	B	19.4
*12/11		0.5
12/13	F	27.0
12/14 & 15	D	51.0
**12/16	D	4.1
12/17	B	18.6
12/22	F	25.0
12/28	D	23.2
12/29	B	19.0
***12/31		0.3

* Scram caused by faulty electrical connection in #1 Beckman.

** Shut down to discharge temporary poison.

*** Scram caused by momentary surge of #1 Beckman.

Operating Experience

Production tests having operational significance are reported below:

105-114-P (Van Stone Flange Corrosion Tests)
 Magnesium alloy slugs were positioned at the front Van Stone flange in six tubes in the F pile in order to evaluate their effect on Van Stone flange corrosion. All six Van Stone flanges were in good condition.

105-168-P (Replacement of Pile Helium Atmosphere with CO₂)
All three piles are now operating with CO₂ in the helium atmosphere. Changes which were made during the month and month end conditions are listed below:

- 100-B: Additions of CO₂ were begun December 20 and increased in increments of 3% at 24-hour intervals. Checks of operating data and unit motion indicators revealed no abnormal conditions. The concentration of CO₂ at month end was 10%. This concentration will be increased during January, 1949, when additional unit motion indicators have been installed.
- 100-D: The concentration of CO₂ was held at 40% during the entire month. No changes in operating conditions were noted.
- 100-F: Additions of CO₂ were begun on December 3 and the concentrations were increased in 3% increments at 24-hour intervals during equilibrium conditions until December 18 when 25% concentration was reached. This concentration will be held for complete evaluation of the results of this change. No unexpected operating conditions were observed during this change.

105-194-P (Unannealed Alpha Rolled Slugs)
Eight tubes, each containing sixty-four four-inch unannealed alpha rolled pieces, were discharged without incident on December 22.

Examination of the 4-inch metal pieces discharged from Tube No. 0569-B, which contained a ruptured piece (see P Division Monthly Report for November), revealed a piece with the cap displaced. A protrusion was noted on the exposed end of the metal slug. The force exerted on the cap by the metal apparently caused a rupture of the can wall at the interface between the metal and the cap. The cap weld was found to be intact. Details of this examination will be covered in a special report. A borescopic examination of this tube revealed no damage and it was reloaded with regular metal.

All three piles experienced unusual pressure drop acceleration during the month. These increases are considered abnormal for this season of the year and investigations of this problem are under way.

Considerable difficulty was experienced with the discharging of alpha-rolled, lead-dipped metal during the month at the D and F piles. A total of 66 tubes containing this type of metal required extensive oiling before they could be discharged, and four of the tubes at F Area required one hour's saturation with oil before they could be discharged. The metal in these tubes had an average concentration of 225 M.W./ton; in view of these difficulties a decision has been made to abandon any efforts to increase, beyond this point, the concentration of the remaining 62.5 tons of alpha-rolled, lead-dipped metal now in the piles.

P Division

A stuck slug was encountered at D Area on December 4 in Tube No. 1788-D, which contained alpha-rolled, lead-dipped metal. The slug was successfully discharged using the usual stuck slug procedures and the hydraulic equipment. The tube was replaced and recharged on the same day.

Mechanical Experience

All horizontal and vertical safety rods were in satisfactory operating condition at month end with the exception of three vertical safety rods, No. 23 at B Area and Nos. 27 and 36 at D Area. Vertical Safety Rod No. 23 at B Area was sticking at month end and will be corrected during the first outage in January.

No. 27 Vertical Rod at D Area was dismantled during the December 15 outage and a new 2 $\frac{1}{4}$ " (DR) type stainless steel rod and guide were installed. The rod failed to go in when tested and an attempt to install an eccentric rod guide was abandoned when it was found that the interior of the guide was rough. The old rod and guide were replaced on December 28 but remained inoperable at month end. No. 36 vertical rod at D Area became tangled during the startup of December 28 and was secured in the out position until the first outage in January.

Other work, of an unusual nature, on safety rods during the month included:

- 1) During routine maintenance work on Rod No. 37 at B Area, the section next to the tip was found to be split and was replaced. Work was continued during the month on the realignment of No. 4 horizontal rod at B Area and at month end the galling condition noted in last month's report had been corrected.
- 2) The installation of the new 2 $\frac{1}{4}$ " (DR) type stainless steel rods and guides in No. 15 position at D Area and in No. 11 position at F Area was made. These installations were made to evaluate the performance of this type rod.
- 3) No. 6 Horizontal Rod at F Area stuck during pre-startup tests on December 6. Realignment of the outer rod guides and removal of rough spots on the side of the rod resulted in satisfactory operation. Examination of No. 7 Horizontal Rod at F Area revealed several gouged spots on top of the rod. The rough spots were removed but the rod still tends to bind at the extreme "in" position.
- 4) A vertical alignment of all rod guides at D Area was completed during the month.

Two process tubes were replaced during the month as follows:

Tube No. 1467-D was replaced on December 14 after having been discharged with difficulty on November 16.

Tube No. 1788-D was replaced on December 4 after difficulty had been experienced in discharging it.

DECLASSIFIED

P Division

During the course of the yearly Van Stone flange inspections at D Area, a split front flange was found on Tube No. 4561-D. Since there was insufficient gunbarrel clearance available to allow turning a new Van Stone flange, it was necessary to discharge the partially exposed metal and make preparations to install a new tube. The new tube will be installed during the first outage in January.

Additional unit motion indicating equipment was installed during December at D and F Areas in order to evaluate more accurately the effects of CO₂ addition to the pile atmosphere.

A part of the concrete wall which separates the 107-D and 107-DR flumes at the 1904-D Building was removed during the December 14 shutdown in order that the water from the 107-DR Building could be diverted to the river via the 1904-D river effluent lines.

During the annual overhaul and inspection of the 100-D Area 30-ton Whiting crane, the drum was reground and new cables were installed. In accordance with Engineering Recommendation No. 100, a new stainless steel alloy brake shaft was installed; similar installations will be made at the other 100 Areas in the future.

Calcium hypochlorite was added to the water heel in the south side of the 107-D basin in a continuation of the algae control program. Results appear to be satisfactory.

Pile Development

An articulated perforated aluminum dummy train used for seating the charge in tubes containing no front dummies has been developed and tested satisfactorily. Linking these dummies together in this manner provides a time-saving method of withdrawing the dummies from a tube without the use of a long retrieving rod.

As the result of a study of power level cutbacks resulting from high exit water temperatures following start-up, the standard rod withdrawal order at 100-B Pile was revised, interchanging No. 8 and No. 5 rods. The revised withdrawal order permitted normal start-ups without cutback on the outages of December 7 and 29. The revised order has now been established as standard at 100-B.

A concrete pad used during construction of the DR Pile has been modified and fenced in for use as a cask storage and handling area.

In an effort to decrease the time required for charge-discharge operation and in order to more easily remove pieces which are difficult to discharge, the following steps were taken during the month:

- 1) The air system pressure was increased from 80 p.s.i. to 100 p.s.i. to enable the regular charging machine to move the "reluctant" pieces. It is estimated that this change reduced the time required for discharging a tube by twenty-five percent.

P Division

- 2) The fabrication of expanding rubber plugs, which may be inserted inside the end of a tube thereby shutting off the water supply and allowing the tube to be filled quickly with the oil solution and left until later for discharge, has reduced the time consumed in discharging "reluctant" tubes. ✓ let's do it
- 3) The fabrication of a fourteen-foot seating pole to seat charges after the front dummy charge has been removed has allowed these front dummies to be retrieved during a normally idle time for the front face crews; it is estimated that approximately one hour of elevator time is saved during a thirteen ton discharge as a result of using this piece of equipment.

GAS PROCESSING BUILDING

The dismantling and transfer to Construction of equipment in No. 2 purification room and No. 2 purge blower room at B Area was completed during the month.

SPECIAL HAZARDS

During the month, the 107-B pump room and the 105-B apparatus room danger zones were reduced in size as a part of a program aimed at reducing costs by eliminating unnecessary S. W. P. handling.

The contaminated car which was received in November containing a return shipment of "B" casks (see November report) was rehabilitated by replacing the floor boards and side walls to a height of three feet. The car has been released for service.

Readings on the top far neoprene seal at F Area increased during the month to 1350 mr/hr average as compared to 480 mr/hr reported during November. This reading included a reading of 54 mrem/hr of fast neutrons.

After the installation of the shorter rod guide in No. 27 thimble at F Area, readings of 173 mrem/hr of fast neutrons were experienced at the bumper plate. This condition resulted in a fast neutron reading of 13.5 mrem/hr at the vertical safety rod rail. The reading at the rail is approximately ten times greater than normal. Plans are now being developed to install additional shielding above the bumper plate.

300 AREA - METAL FABRICATION

Production Statistics

Production for the month of December was as follows:

Billets Produced	36 Tons
Rods Machined	190 Tons
Acceptable Pieces Canned	141 Tons

DECLASSIFIED

Melt Plant

The casting yields were as follows:

	<u>November</u>	<u>December</u>	<u>To Date</u> <u>1948</u>
Billet	66.7	61.3	67.5
Solid Material	84.3	80.2	85.5

Considerable difficulty was experienced during the month with rough surfaces on billets, thus causing a reduction in the yield. It appears the rough surface condition results from the uneven application of the Zirconite mold wash on the inner surface of the mold, accompanied by insufficient drying before use. The use of the Zirconite wash will be continued on a controlled basis for another month, however, in an effort to realize the improved mold usage reported by other sites to result from the use of a mold wash; in this connection, the temperature of the mold preheat oven will be increased to the maximum possible in order to minimize the effects of inadequate drying.

One hundred crucibles fabricated from CS-312 graphite have been received. Twenty-five crucibles of each of the following four types were included in this order: Standard dimensions, standard dimensions with tapered inner sidewall, standard dimensions except for thick wall, and thick-wall with tapered inner sidewall. The evaluation of these crucibles was started on December 22.

Several billets were processed during the month with flat and chamfered ends instead of the conventional egg end. The rods rolled from these billets will be checked to determine if the quality of rod ends is improved.

Authorization to reduce the sampling of casting heats from 100% to 10% of all heats was received on December 23. This change is outlined in the revised "Operating Process for Uranium Remelting and Casting", Document No. HW-11745.

Machining

Machining yields were as follows:

<u>% Yield (4" A's)</u>		<u>To Date</u>
<u>November</u>	<u>December</u>	<u>1948</u>
69.1	67.6	68.5

Chip Recovery

The Chip Recovery yield was as follows:

<u>% Yield</u>		<u>To Date</u>
<u>November</u>	<u>December</u>	<u>1948</u>
92.0	92.3	91.3

P Division

The entire Chip Recovery Process was operated 14 eight-hour shifts, with the press being operated an additional 19 eight-hour shifts. A total of 66,394 pounds of TXB was produced.

The Chip Recovery operation was shut down on November 24 because of excessive vibration in the centrifuge. Repairs were completed and operation resumed on December 2. On December 15 it was necessary to shut down again when the shaft assembly was broken loose from the housing of the centrifuge at the weld. After repairing the weld and realigning the shaft and basket assembly, operation was resumed on December 22.

The material burned in the oxide burner was as follows:

Weight Out - Lbs.		
<u>November</u>	<u>December</u>	<u>To Date</u> <u>1948</u>
20,309	14,458	129,981

Canning Operation

The canning yield was as follows:

% Yield (4" A's)		
<u>November</u>	<u>December</u>	<u>To Date</u> <u>1948</u>
88.6	87.1	88.5

Canning rejects, by cause, were:

	% Total Canned (4" A's)		
	<u>November</u>	<u>December</u>	<u>To Date</u> <u>1948</u>
Non-Seating	2.8	3.5	4.1
Marred Surface	2.7	3.0	1.8
ALSi on Outside of Can	0.5	0.7	0.9
Frost Test	1.9	2.4	1.4
Bad Welds	0.9	0.9	1.5
Miscellaneous	<u>2.6</u>	<u>2.4</u>	<u>1.8</u>
	11.4	12.9	11.5

The canning yield was 1.5% less than that for November. The increase in non-seats, marred surface, and frost test rejects was the major cause for the lower trend in yield. The quality control program started last month to reduce non-seating and bad weld rejects was extended to cover marred surface and frost test rejects on December 15. Some reduction in marred surface rejects was realized during the later part of the month.

P Division

Frost test rejects were reduced appreciably after December 21 when the use of standard 4" caps was resumed. A large percentage of the frost test rejects prior to that date was caused by the increased torque applied to the alternate thick cap during facing, which broke the bond between the can and the slug at the base of the cap.

Work was continued on Production Test No. 313-107-M, (Supplement A), ("Effect of Canning Conditions on Slug Yield and Quality"). The canning of 5842 slugs, machined to a diameter of $1.352" \pm .002"$ and length of $4.040" \pm .010"$, was completed on December 1. In addition two other lots of 100 slugs each, machined to a diameter of $1.350" \pm .001"$ and a length of $4.045" \pm .010"$, were canned with an equal number of control slugs having standard "A" dimensions. Non-seating rejects were significantly lower for the smaller diameter slugs and no AISi penetration of the can wall to within less than .010" of the surface was found. Control pieces showed as high as 8.3% penetration to within less than .010" of the can surface.

Twenty-four slugs were dipped in the bronze and tin baths and quick quenched in water. Later they were reheated in the tin bath and canned. This was a part of the preliminary work on Production Test No. 313-108-M, ("Effect of Quick Quenching from the Beta Phase on the Behavior of Uranium Slugs"). The purpose of this test is to prepare canned slugs for pile testing that are free or almost free of columnar grains, and with a grain size that is 5 to 10 times smaller than that of standard triple-dipped slugs.

The following special canning was done during the month:

<u>Request No.</u>	<u>Contents</u>	<u>Number of Pieces</u>
S. R. 80	Mercuric Oxide	1
S. R. 80-1	Mercuric Oxide	3
S. R. 85	Selenium	1
S. R. 86	Thallium Nitrate	1

In addition, 30 receptacle slugs, 51 papoose slugs, and 6330 poison slugs were canned.

Recovery Operation

	<u>% Recovered</u>		<u>Average Wt. - Lbs.</u>	
	<u>December</u>	<u>To Date</u> <u>1948</u>	<u>December</u>	<u>To Date</u> <u>1948</u>
Z Slugs	78.1	71.5	3.905	3.905
X Slugs	16.9	21.7	3.800	3.849
Rejects	5.0	6.8	—	—
	100.0	100.0		

P Division

Inspection and Testing

Autoclave rejects were as follows:

<u>November</u>	<u>December</u>	<u>To Date</u> <u>1948</u>
0.32/M	0.27/M	0.26/M

A total of twenty-one autoclave failures occurred in December. A large percentage of the failures were in the upper one-third of the pieces and resulted from pinholes in the can wall and around the weld bead.

The "As Received" quality of cans, caps, and sleeves was as follows:

	<u>% Usable - (4")</u>		
	<u>November</u>	<u>December</u>	<u>To Date</u> <u>1948</u>
Aluminum Cans	93.6	95.2	92.5
Aluminum Caps	96.5	96.8	96.6
Steel Sleeves	51.5	98.4	86.0

A supply of standard 4" aluminum caps was received and the use of alternate thick caps ($\frac{1}{2}$ ") was discontinued on December 21. The standard caps were fabricated from $1\frac{1}{2}$ " bar stock. They are of good quality and show no evidence of the folds or crack in their peripheries which caused previous difficulty in welding.

The inspection of 4950 aluminum cans received from the Aluminum Company of America, which were impact extruded from blanks cut from sheet aluminum instead of being cut from bar stock, was completed on December 2. A total of 4401 or 88.9% of these cans was usable. The breakdown of rejects was as follows:

Marred Surface	362
Small Inside Diameter	26
Dents	138
Thick Bottoms	9
Thin Bottoms	14

The acceptable cans were later used in canning with satisfactory results.

Material Handling

Seventy-eight tons of rods were received from Vulcan Crucible Steel Company and 156 tons from Simonds Saw and Steel Company. Eighty-nine tons of billets were shipped to Vulcan Crucible Steel Company and 15 tons of oxide were shipped to Vitro Manufacturing Company.

305 Area Test Pile

A total of 138 tests was run on canned slugs, 57 on billet eggs, 589 on graphite bars, and the following on special work requests.

DECLASSIFIED

P Division

Request No.

No. of Tests

44	To determine absorption cross-section of three samples of aluminum alloyed with magnesium.	10
45	To determine absorption cross-section of AlSi alloyed with magnesium.	10
46	To determine absorption cross-section of Aqua-Dag.	5
47	To obtain ratio between neutron flux on the outside of a bare slug and flux on inside, for use in theoretical calculations.	3
48	To obtain relative absorptions of a regular poison slug and new type cadmium plated spline for use in 105 piles.	7

In addition to the above, 16 tests were run in conformance with Production Test No. 313-107-M, Supplement A, ("Effect of Canning Conditions on Slug Yield and Quality").

Special Hazards

No unusual conditions developed during the month.

Development

A test was made to determine if a viscosimeter could be used to indicate changes in the viscosity of the AlSi canning baths which might contribute to non-seating rejects. The viscosimeter did not have sufficient sensitivity and indicated little or no change in viscosity over a range of 20°C in bath temperature. Additional testing is planned if the instrument can be made more sensitive.

Preliminary checks were made on several gamma extruded slugs to check the theory that it might be possible to obtain a grain structure similar to alpha rolled slugs after beta transformation. Four recc red gamma extruded slugs were processed through the bronze and tin at normal temperatures and on regular cycle, followed by a quick quench in water. The grain structure as observed in the regular cracking test appeared to be the same as for alpha rolled slugs; however, laboratory reports indicated the grains were somewhat coarser.

Preliminary design work has been started on facilities for pickling rods and turnings, dissolving oxides, and the associated recovery equipment.

END

DATE FILMED

01 / 22 / 91