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DATE June 21, 1948

SUBJECT P Division Monthly Report

May, 1948

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- #1-15 - Monthly Report
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 - #19 - W. P. McCue
 - #20 - W. W. Windshimer
 - #21 - A. D. Greninger
- June 21, 1948

P DIVISION

MAY - 1948

This Document consists of

13 Pages

I. GENERAL

The D and F Piles operated at 275 M.W. throughout May except for the outages listed under Area Activities of this report. The B-Pile was maintained in standby condition with a water flow of 10,120 g.p.m. The 100 Area discharge rate continued at 60 tons per month.

The first suspected instance of slug rupture in an operating pile occurred on May 30, 1948 in Tube 1155-F. The metal had only been in the pile since May 19, 1948. All pile effluent water was held in the 107 Building retention basin.

The 300 Area canning production amounted to 98 tons. This quantity was lower than the nominally scheduled amount (100 tons) because of a shortage of Q cleared personnel and a change in the canning method on May 17, 1948 which reduces the production rate. This change involved the discontinuance of the lead dip process and a reversion to the triple dip process and was necessary because it was found that alpha-rolled slugs canned under the former process have a marked tendency to warp and expand laterally during pile exposure, being inferior to the triple-dip slugs in these respects.

The canning yield was 91.0%. This represents an increase of 7.4% over April and was the result of a considerable decrease in the number of "non-seat" rejects.

The 300 Area Melt Plant was placed on a 3-shift, 7-day week schedule on May 10. Beginning May 17, all P Division personnel in the 300 Area were placed on a 6-day a week work schedule.

A number of jobs incident to the contemplated start-up of B Area are in progress.

II. ORGANIZATION AND PERSONNEL

Number of Employees on Payroll - May

Beginning of Month:	308
End of Month:	<u>302</u>
Decrease:	6

Decrease due to voluntary transfers from the 300 Area.

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One chief operator was transferred from 100-F Area to the 300 Area, and two experienced 300 Area operators were transferred to the 100 Areas in preparation for the 100-B Area start up.

Several transfers of supervisory personnel were made, as follows:

W. W. Windsheimer, Assistant Chief Supervisor, from 100-D to 100-B on May 3 to prepare the latter area for start up.

A. A. Janco, Area Supervisor, from 100-D to head up the Process Control group on May 17.

J. A. Haaga, Senior Supervisor, from 700 Area to 100-D, as day relief supervisor, on May 10.

J. H. M. Miller, Shift Supervisor, from 700 Area to 100-D on May 24 to follow construction of Pile DR.

S. L. Nelson, Senior Supervisor, from 300 Area to 100-F for training on May 10.

D. L. DeNeal, Shift Supervisor, from 300 Area to 100-F for training on May 3.

C. G. Lewis, Shift Supervisor, from 100-F to Design and Construction liaison work on May 24.

III. AREA ACTIVITIES

<u>PILE SUMMARY</u>	<u>PILE B</u>	<u>PILE D</u>	<u>PILE F</u>
Time Operated (%)	-	74.3	77.9
Operating Efficiency (%)	-	73.3	73.9
*Power Level (H.P.)	0	275	275
*Inlet Water Temperature (°C)	11.3	12.1	11.8
*Outlet Water Temperature (Maximum °C., 10 tubes, .240" Zone)	11.5	54.3	54.3
Number of Scrums	0	3	4
Number of Purges	0	1	1
Helium Consumption (cu. ft.)	28,820	**91,747	**92,470
Metal Discharged (tons)	0	26.7	36.78
Hours Gained (this month)	0	0	12
Hours Poisoned	-	358	295
Hours in Gas	-	***63	70

...attributed to purging required following neoprene ... work.

...attributed to presence of carbon dioxide in gas ... system.

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PILE BUILDING

Outage Breakdown:

<u>Date of Outage</u>	<u>Scheduled</u>		<u>Unscheduled</u>	<u>Length of Outage (Hours)</u>
	<u>Metal Discharged</u>	<u>Maintenance</u>		
5-1-48		F		4.8
5-1-48	F Area shutdown to discharge temporary poison			3.1
5-4-48	D			19.8
*5-10-48	D	D		128.7
5-12-48	F			26.6
5-15-48	D Area shutdown to discharge temporary poison			4.9
5-19-48	F			46.7
5-21-48	F Area shutdown to discharge temporary poison			2.5
**5-22-48			D	0.2
**5-22-48			F	0.5
5-25-48	D			19.7
**5-26-48			D	0.1
**5-26-48			D	0.3
5-26-48	F			22.1
**5-26-48			F	5.1
**5-27-48			D	16.2
5-27-48	F Area shutdown to discharge temporary poison			2.9
**5-27-48			F	9.5
5-27-48	F Area shutdown to discharge temporary poison			2.4
**5-30-48			F	37.5

*Extended outage for cork seal removal on far side of unit.

**Unscheduled outages for following reasons:

<u>Date</u>	<u>Area</u>	<u>Reason</u>
5-22	D	Power surge caused by crane striking 13.8 KVA line in DR Area.
5-22	F	Faulty controller, #4 Beckman.
5-26	D	Power surge caused by electrical storm.
5-26	D	" " " " " " " "
5-26	F	" " " " " " " "
5-27	D	Critical "Y" power condition; impossible to restart unit because of transient poison.
5-27	F	Critical "Y" power condition; electrical outage.
5-30	F	Unit shut down because of high water pressure on Tube No. 1165-F.

Operating Experience

A number of special request samples were processed during May; details of their irradiation may be found in the Technical Section of this report.

Production Tests having operational significance during the month are reported below:

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- 105-1-P (Effect of Pile Operation on Properties of Graphite)
Tubes 5478-D and 1582-D were discharged on May 10 and 25 respectively. These tubes had operated as gas filled tubes (without cooling water) to evaluate effects of various atmospheres on graphite at ambient pile temperatures. Discharge was effected without difficulty.
- 105-103-P (Corrosion Rates at Elevated Temperatures)
The orifices of ten selected tubes in D pile were changed from 0.240" to 0.200" to develop higher than normal water temperatures.
- 105-119-P (Effect of Fabrication Temperature on Blistering)
As a result of experience with material under this test reported in April (HW-9922-A) and some difficulty in discharging Tube 1979-D on May 15, Tubes 1058-D and 1973-D also were discharged on May 15. These latter two tubes had not reached normal concentration and were discharged without difficulty. This completes the discharge of all material charged under this test.
- 105-121-P (Dependence of Reactivity on Power Level)
A reduced power start-up was performed at F pile following the shutdown of May 12. The unit was started up 26.6 hours after shutdown and operated at 125 M.W. for 13 hours. The level was then raised to nominal 275 M.W. No difficulties were experienced in making the test and the predicted reactivity values compared favorably with actual results.
- 105-168-P (Replacement of Pile Helium Atmosphere with Carbon Dioxide)
The percentage of carbon dioxide in the gas circulating system was maintained at 85% (nominal) throughout the month, except during the extended outage of May 10, 1948.
- 105-175-P (Pile Heat Liberation During Shutdown)
The first three parts of the test were conducted at F pile during the month. Conditions and results are tabulated below:

Date	Time After Shutdown Flow Reduced	Water Rate Reduced to	Length of Time at Re-duced Flow	Maximum Packing Temp. Rise	Approx. Max. Exit Water Temp. Rise	Max. Bulk Water Temp. Rise
5-12-48	2 hours	5000 gpm	12 hours	0°C	5°C	3.1°C
5-19-48	2 hours	3500 gpm	*10 hours	0°C	7°C	4.7°C
5-26-48	3 hours	2000 gpm	15 hours	0°C	7°C	4.6°C

* Test discontinued to raise water pressure for removal of piecus downstream of stuck slug in Tube 2265.

- 105-80-P (Irradiation of Beta Slug - Supplement A)
The sodium and uranium beta slug charged in Tube 1481-F

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on April 29 (See Doc. No. HW-9922-A) was discharged without difficulty on May 12. A second beta type slug was charged into this tube on May 26, 1948.

105-200-P (Special Irradiations - One Year Samples)
On May 25, Tube 1769-D was charged with several special irradiation pieces; it will be discharged after approximately one year. One of the pieces charged had been previously irradiated. The charging of this piece was effected without incident by the use of special equipment.

Six additional bismuth columns were charged at F Area making a total of 30. The D-Area loading remained constant at 30 tubes.

The filter capacity tests at 183-D and 183-F buildings were discontinued on May 29. High iron content of the inlet water, occasioned by flood stage water flow, forced return of additional filters to the system to maintain specifications on process water.

As reported above, the F pile was shut down on May 30 because of high pressure on Tube 1165-F. This effect was accompanied by a high effluent water activity reading on header 11 $\frac{1}{2}$. Monitoring of the rear nozzle of the tube after shutdown gave results which could be attributable to fission product contamination that would result from slug rupture. At month end, investigation of the situation and removal of the charge is in progress.

Mechanical Experience

All vertical safety rods are in satisfactory operating condition at month end with the following exceptions:

- #25-D - showed evidence of binding on May 27; presently tied out of service for repairs.
- #25-F(Failed to operate when unit commenced on May 26; presently
- #35-F(tied out of service for repairs.

Considerable work was done on the vertical safety rods during May. Important jobs are summarized below:

At D pile rods #14, 22, 25, and 26 were rotated in the guides to eliminate binding and clutches were adjusted on rods #13, 16, 23, 25, and 29.

A F pile rods #14, 20, and 27 were oiled to reduce dragging.

Following the discovery of a deposit of fine iron dust in several of the vertical safety rod thimbles at F pile, complete investigation revealed that eleven rods would not enter the unit completely. Measurements at D pile indicated the presence of sufficient material in the thimbles to allow less than 1" vertical clearance on all but six rods. A program of dust removal has begun at F pile. Using an industrial type vacuum cleaner, fitted

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with a filter box and cyclone separator, the material has been satisfactorily removed from thimbles Nos. 13, 14, 20, 30, and 37.

All horizontal safety rods are in satisfactory operating condition at month end. Major work done during the month included:

Replacement of the burned-out, low-speed electric motor on A rod in D pile...Satisfactory welding of a pin-hole water leak in No. 7 rod at 100-B Area.

The far side rear vertical neoprene seal was replaced at D Area during the May 10 outage. At the same time, the cork was removed from the expansion joint between the discharge area and the far side of the unit. This latter job is in line with the program to relieve strain on the unit shields discussed in the April report. An offset crack in the wall where the cork was removed provides sufficient shielding and eliminates the necessity for special work similar to that done on top of the units.

As a part of the program discussed above, the brick on top and on the far side of the B pile was removed during the month. Due to the absence of cork on the far side, it was necessary to remove a considerable amount of brick to leave a two-inch space next to the unit. The portion of neoprene seal that extended through this wall was replaced while the brick was out.

Approximately six percent of the work has been completed on the installation of the new 135-107 effluent sewer at F Area. The emergency alternator and electrical lines and poles have been relocated and excavation is now in progress.

F Area experienced two cases of stuck plugs during the month. These are summarized below:

On May 20, Tube 0865-F could not be moved with the automatic charger after the sixth piece had been discharged. Forces up to 6,000 p.s.i. were applied with the specialized equipment with no further charge movement. The pieces downstream of the stuck slug were washed out, the stuck piece back-seated, the ribs cut out of the tube downstream of the stuck slug, and the remainder of the charge pushed out without difficulty. During the discharge of this tube, the rear gun-barrel bellows was ruptured. Temporary repairs were effected by the installation of a rubber boot. The front Van Stone flange also was broken during the course of this work.

On May 30, when the unit was shut down because of high pressure (see discussion under Operating Experience), attempts to discharge Tube 1165-F with pressures up to 6000 p.s.i. were unsuccessful. Work of fabricating equipment for removal of metal on each side of the stuck piece is in progress at month end.

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Pile Development

The program of algae removal at the 107 basins by chlorine treatment continued during the month. On May 21, microscopic examinations indicated that the calcium hypochlorite treatments at 100-D Area have been effective in killing the algae and other organisms, and the algae mat has peeled from the walls in several spots. The program will be continued.

On May 4, a trial run of a hot slug counter, designed to record individual slugs as discharged, was made at 100-D. The test indicated the need for further development work. The counter is being studied as a part of the segmented discharge program. Newly designed segmented discharge equipment, which involves the use of a reel and metal retrieving tape, was tested at the B pile during May. The trial was conducted under simulated operating conditions and the results appeared encouraging, although some design modifications are required.

The installation of slack cable limit switches has been completed on two of the vertical safety rods at B pile. The assembly was thoroughly tested during the month and appears very satisfactory.

GAS PROCESSING BUILDING

During the removal of the stuck slug from Tube 0865-F, the front Van Stone flange was broken allowing water to enter the gas circulating system. This water was removed from the inlet gas duct sump and the system was dried from 0.1% to 0.038% moisture in sixteen hours by the operation of two dryers.

SPECIAL HAZARDS

The lead brick shielding on the discharge area side of the openings cut in the wall across the top of the units has been augmented by the installation of a 1" thick steel plate at D pile. This arrangement has eliminated radiation readings from this source.

Excavation for the effluent sewer at 105-F has exposed the present sewer line and revealed additional water leakage. The area surrounding the excavation has been set up as a danger zone and a burial trench has been dug for disposal of the contaminated earth.

All possibly contaminated water resulting from the incident in Tube 1165-F is being held in the retention basin 107-F for analysis. As soon as the water flow to this tube was shut off, the remaining uncontaminated low flow through the pile was diverted to the river.

The removal of rust accumulation from the vertical rod thimbles resulted in high readings on the separator used with the vacuum cleaner. The separator was shielded with lead and, when work was finished, the entire separator assembly and its contents were buried.

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300 AREA - METAL FABRICATION

Production Statistics

Production for the month of May was as follows:

Billets Produced	61 Tons
Rods Machined	150 Tons
Acceptable Pieces Canned	*88 Tons

*Includes approximately 34 tons of triple dipped material.

Melt Plant

The casting yields were as follows:

	% Yield		
	<u>April</u>	<u>May</u>	<u>To Date 1948</u>
Billet	73.7	75.5	72.6
Solid Metal	89.1	92.8	89.3

Operation was on a three-shift, five-day week schedule until May 10 when it was placed on a three-shift, seven-day week schedule. Because of the continued shortage of graphite crucibles and molds only solid scrap was melted during the month.

On May 3, the 16" high-vacuum valve to the north H-16 diffusion pump failed to operate. The valve was disassembled and it was found that material from the furnace room floor had worked down around the stem into the sleeve and burred the threads. After the defective parts were machined the valve was returned to service. A rubber boot was placed around the top of both the north and south valves to prevent recurrence.

Difficulty was encountered with crucibles cracking during the melting cycle. Three failed on May 5, 7, and 10, respectively, in the A furnace and one on May 18 in the B furnace. No coils were damaged, but it was necessary to replace all brick work underneath the coils. The crucible failures appeared to have resulted from the filler having been burned to the extent that the strength of the graphite was reduced appreciably. Crucibles that appear to be burned on inspection are now removed from service, even though they are not cracked.

The Stokes finishing pump failed on May 5. Inspection revealed that the valve spring and plate were broken. The parts were replaced and the pump returned to service on May 6, 1948.

The magnetic contactor in the starter switch on the "A" motor generator set burned out on May 15. One of the lead wires to the switch was found to be defective and apparently caused the difficulty. The contactor was replaced temporarily with three small units on May 17. They have functioned satisfactorily to date and will be replaced as soon as a standard unit is received.

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The installation of the $\frac{1}{2}$ -ton electric hoist and monorail in the billet sawing room was completed on May 22. This installation provides a safer means of handling billets through the sawing and weighing operations.

A 5-ton crane was installed in the furnace room. This work, which was begun on May 17, necessitated suspending furnace operations on the day shift May 17 to May 20, inclusive, and partially through May 25 to complete the welding of monorails to the ceiling. Electrical connections remain to be completed.

On May 18 it was noted that an abnormal amount of oil was collecting in the drip leg of the exhaust line from the Stokes pump. Several backfires occurred during this period, presumably due to oil vapor locks in the exhaust line. The north Stokes pump was overhauled on May 24 with an appreciable reduction in the amount of oil collecting in the drip leg. It is planned to install stainless steel flash screens at the exhaust flange of each pump and further investigation will be made.

Annealing and Machining

Machining yields were as follows:

<u>% Yield (4" A's)</u>		
<u>April</u>	<u>May</u>	<u>To Date 1948</u>
66.5	67.1	66.7

No improvement has been shown on machining yields. The yield on rods rolled to a finished diameter of 1 7/16" at Lockport was 66.1%. Although these rods were slightly reduced in diameter (1/16"), an increase at the same time in solid scrap more than compensated for the reduction in turnings. A number of cuts were made at random on rods to determine the minimum depth of cut necessary to obtain complete cleanup. They ranged from a minimum of 0.016" to a maximum of 0.124" (near rod end). As the result of both poor surface quality and irregularity of rod diameters, it does not appear that further reduction in rod diameter would be practical at present.

Three carloads of alpha rolled rods weighing a total of 111 tons were received on May 2. A total of 79 tons was rolled at Lockport and 32 tons at Joslyn. On May 29 two carloads, totalling approximately 105 tons, were received from Joslyn; these represent the first rods fabricated from billets produced at the Hanford Works.

Seventy-five B billets were gamma extruded on May 6 in conformance with Production Test No. 314-55-M, "Duplexing Uranium". The billets were divided into four groups; the first, third, and fourth group contained nineteen billets each and the second contained eighteen. The four groups were extruded through dies having land diameters of 1.613", 1.675", 1.738", and 1.800", respectively. The resultant average rod diameters were 1.564", 1.627", 1.688", and 1.750", nominally, respectively. The rods were shipped to Lockport on May 14 to be rolled to a finished diameter of 1 7/16". After rolling they will be returned for processing.

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Production lots 586, 587, and 588, which were reported as under-annealed and held following canning last month, were found to have the desired grain characteristics after canning. The finished pieces were released for normal handling.

Chip Recovery and Oxide Burning

The Chip Recovery yield was as follows:

<u>% Yield</u>		
<u>April</u>	<u>May</u>	<u>To Date</u> <u>1948</u>
88.9	90.1	89.7

Chip Recovery operated 30 eight-hour shifts and processed 90,414 pounds of briquettes in May. The processing of a backlog of turnings was completed on May 22, and Chip Recovery is now being operated only as necessary to process current material.

The material burned in the oxide burner was as follows:

<u>Weight Out - Lbs.</u>		
<u>April</u>	<u>May</u>	<u>To Date</u> <u>1948</u>
6473	9973	38057

The oxide burner was operated daily. Replacements for the exhaust ducts are now being fabricated and will be installed next month.

Canning Operation

The canning yield was as follows:

<u>% Yield (4")</u>		
<u>April</u>	<u>May</u>	<u>To Date</u> <u>1948</u>
83.6	91.0	87.8

Canning rejects, by cause, were:

	<u>% Total Canned (4")</u>		
	<u>April</u>	<u>May</u>	<u>To Date</u> <u>1948</u>
Non-Seating	9.5	3.4	4.8
Marred Surface	1.0	1.5	1.3
ALSi on Outside of Can	2.0	1.4	1.4
Frost Test	1.6	.9	1.5
Bad Welds	1.3	1.3	1.3
Miscellaneous	1.0	.5	1.9
	16.4	9.0	12.2

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The lead dip process for canning was discontinued and a complete reconversion was made to the triple dip process on May 17.

Canning yields for the month showed a general marked improvement over last month, except for the first week after converting to the triple dip process. The lower yields at that time can be attributed chiefly to the unfamiliarity of a number of operators with the process.

The thermocouple lead wires to seven furnaces have been replaced with chromel-alumel wire. This work is being done as each furnace is shut down for routine overhaul and will be completed next month.

The use of hydrofluorosilicic acid as a cap etchant was discontinued on May 10. Phosphoric acid was substituted as per revised operating process, Document HW-9401, "Process for Canning Uranium Four-Inch Slugs".

Considerable work has been done since converting to the triple dip process in an attempt to determine the optimum dipping time and/or temperature of the bronze to gain the desired grain size and orientation in alpha rolled material. Slugs have been dipped in the bronze for periods ranging from 20 to 70 seconds and temperatures ranging from 700° C to 725° C. To date no definite conclusions have been reached.

A total of 5297 acceptable "commercial grade" aluminum cans were used in conformance with Production Test No. 313-102-H, "Evaluation of Four-Inch Commercial-Tolerance Cans". The overall quality of the canned pieces compared favorably with those canned using regular process cans. Therefore, the canned pieces have been released for normal handling.

Three pieces of Special Request No. 40 (Plutonium) were canned. In addition, a total of 1545 poison slugs and 2403 lead slugs were canned during the month.

	<u>% Recovered</u>		<u>Average Wt.-Lbs.</u>	
	<u>May</u>	<u>To Date 1948</u>	<u>May</u>	<u>To Date 1948</u>
Z Slugs	63.3	71.9	3.898	3.907
X Slugs	28.1	19.9	3.854	3.853
Rejects	<u>3.6</u>	<u>8.2</u>	--	--
	100.0	100.0		

Recovery was operated on a two-shift schedule in May. A total of 48 tons of gamma extruded triple dip 8" canned pieces and 19.4 tons of 4" canned gamma extruded lead dipped pieces remain to be recovered and converted to solid scrap for remelting.

Inspection and Testing

Autoclave rejects were as follows:

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	April	May	To Date 1948
	0.51/M	0.18/M	0.42/M

A large improvement was shown in autoclave failures this month with only nine occurring as compared to 24 in April. The chief causes for failures were pin holes and insufficient bonding of the cap.

The "As Received" quality of cans, caps, and sleeves inspected during the month was as follows:

	% Useable (4")		
	April	May	To Date 1948
Aluminum Cans	83.7	94.2	89.2
Aluminum Caps	95.0	98.1	98.1
Steel Sleeves	82.1	86.1	78.0

305 Area Test File

This unit was operated on a one-shift five-day schedule until May 17, after which it operated on a one-shift six-day schedule. Eighty-five tests were run on canned slugs, 75 on billet eggs, 406 on graphite bars, and the following on special work requests.

<u>Request Number</u>		<u>Number of Tests</u>
23	To obtain absorption cross-section of Amercote plastic paint.	3
24	To find an approximately average bar for each of six experimental heats and to determine its dih as accurately as possible.	30

Standards selected from "finished" graphite bars are now being used in testing all graphite of this grade. This was done because of the higher dih range of "finished" graphite as compared to unfinished graphite.

The number of sample bars per heat for "finished" graphite has been reduced from sixteen to eight bars.

Special Hazards

Approval was received to issue free-issue safety shoes to all personnel assigned to operations where shoe covers have been routinely required.

Development Work

On May 11, a billet having a machined surface was successfully extruded in the alpha phase through a three hole, bell-mouthed die having land diameters of 1.455". The billet was preheated in the rotary furnace

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for sixty-five minutes at a temperature of 1180° F. The contact temperature reading on the billet was 1040° F prior to extrusion and it required a maximum pressure of 750 tons to extrude. Even though a 4" graphite wafer was inserted between the dummy block and the billet, it was necessary to saw the rods to remove them and the butt from the die. The die was observed to be cracked and further tests could not be made. The container used on this run was previously honed and burnished with powdered graphite.

Another attempt was made on the same date using a regular single-hole die (1.455" land diameter). Temperatures and other conditions were the same as above. The billet extruded approximately three inches at a pressure of 1000 tons.

On May 21, an additional attempt was made to extrude in the alpha phase. Two billets, one with a machined surface and the other normal, were preheated at a temperature of 1180° F. They failed to extrude at 1000-ton pressure through a three-hole bell-mouthed die having land diameters of 1.455". On the same date an attempt was made to extrude a machined surface billet under the same conditions, except for using a single-hole bell-mouthed die with a land diameter of 1.455". This billet also failed to extrude at 1000 tons pressure.

A supply of Zirconite mold wash material was received. Prolongation of mold life in the Melt Plant resulting from its use will be evaluated in the coming month.

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