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DATE December 20, 1948

SUBJECT F Division Monthly Report -
November, 1948

To File

FROM E. P. Lee

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W. J. ... 12-28-48
J. H. ... 12-31-48
G. B. ... 1-4-49

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100-11435-17

1-16 - Monthly report
17 - E. A. Wegener
18 - E. A. Wegener
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20 - E. A. Wegener
21 - E. A. Wegener
22 - A. D. Croninger
23 - 300 File
24 - 700 File

P DIVISION

NOVEMBER, 1948

I. GENERAL

December 30, 1948

All piles operated at 275 M.W. throughout the month except for outages listed under Area Activities in this report and except that F Pile operated at a reduced level during the first half of the month. This operation at reduced level was incident to the leaking process tube reported last month.

A total of 81.4 tons of metal was discharged from the piles during the month.

The 300 Area canned a total of 150 tons of acceptable slugs during the month to establish a new production record.

On November 29 the operating schedule for the Melt Plant was changed from a three-shift to a two-shift, six-day week schedule. The backlog of material largely had been worked off and the new schedule is adequate for processing the current accumulation of scrap.

II. ORGANIZATION AND PERSONNEL

Number of Employees on Payroll - November

Beginning of Month	367
End of Month	372
Net Increase	5

Nine operators were hired and one was terminated. Eight operators were transferred from the 300 Area to the 100 Areas for training in anticipation of the startup of H Pile. Three operators were transferred to the S Division.

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

E. A. Wegener, Shift Supervisor, was transferred from 100-B Area to the Design-Construction liaison group.

W. K. Wright was promoted to Shift Supervisor on November 1 and assigned to the Canning and Dipping process in the 300 Area.

J. A. Cowan was promoted to Senior Supervisor of Melt Plant operations in the 300 Area on November 1.

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TO UNCLASSIFIED
BY AUTHORITY OF RLO-CG-4 11/7/90
BY J. F. Davis S.E. Gydesen
M. Cardwell DATE 12-28-90
12-28-90

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III. AREA ACTIVITIES

<u>PILE SUMMARY</u>	<u>PILE B</u>	<u>PILE D</u>	<u>PILE F</u>
Time Operated (%)	89.1	90.3	85.1
Operating Efficiency (%)	88.2	88.1	68.1
*Power Level (M.W.)	275	275	275
*Inlet Water Temperature (°C)	9.1	9.0	9.2
*Outlet Water Temperature (Maximum °C., 10 tubes, 0.240" Zone)	56.6	48.2	52.4
Number of Scrams	1	1	1
Number of Purges	1	1	0
Helium Consumption (cu. ft.)	65,032	67,325	145,179
Metal Discharged (tons)	46.12	29.26	6.02
Inhours Gained (this month)	(-)15	19**	1
*Inhours Poisoned	290	462	302
*Inhours in Rods	39	47	95

* Month end figures.

** Not including increased reactivity due to CO₂ in gas system.

PILE BUILDING

Outage Breakdown

<u>Date of Outage</u>	<u>Metal Discharged</u>	<u>Scheduled Maintenance</u>	<u>Unscheduled</u>	<u>Length of Outage (Hours)</u>
11-1-43*		F		81.5
11-2-48	D			19.8
11-5-48	B			19.6
11-5-48**	F			3.5
11-9-48***			F	0.1
11-12-48	B			18.8
11-16-48	D			25.0
11-19-48	B			19.5
11-23-48	D			24.5
11-24-48	F			22.9
11-24-48****			B	0.1
11-26-48****			D	0.2
11-30-48	B			20.6

* Unit down to remove water from graphite.

** Shut down to push temporary poison.

*** Unit scrammed due to Beckman failures.

**** Unit scrammed as a result of an error in by-passing Beckman for routine calibration.

OPERATING EXPERIENCE

Production tests having operational significance are reported below:

105-81-P (Probe Tests of Top Central Tubes)
During the month, the following tubes successfully passed the probes indicated:

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<u>1.480"</u>	<u>1.485"</u>	<u>1.490"</u>
4680-D	4560-D	4667-D
	4569-D	
	4578-D	
	4587-D	
	3959-B	
	3988-B	

- 105-114-P (Van Stone Flange Corrosion Studies)
An inspection of Mg dummies in the rear of Tubes No. 3277-F and 3287-F showed noticeable corrosion. The special dummies were replaced with regular ones.
- 105-168-P (Replacement of Pile Helium Atmosphere with CO₂)
The percentage of CO₂ in the D Pile atmosphere remained at 40 percent throughout the month with no significant change in operating conditions.
- 105-208-P Special Irradiation Request 52)
Four (4) tubes containing U-235 and exposed in accordance with this production test were discharged from the D Pile on November 15. The material was handled and is now stored in the basin as outlined in Document No. HW-9797, "Safety and Security Measures with Regard to Hanford Request No. 52", J. E. Maider to the Atomic Energy Commission, dated May 17, 1948.
- 105-214-P (Silica Feed Reduction)
Under provisions of this test, silica feed was reduced from 3.5 to 2.5 ppm nominal on November 16 at the B Pile. No further decrease is contemplated, and this rate will be maintained for approximately six months in order to permit final evaluation of this change. The previously reported acceleration of pressure drop rate at the 3.5 ppm feed was apparently caused by some change in river water chemical content.
- 105-225-P (Vertical Rod Guide Radiation Leakage)
A special mock-up of a new vertical rod guide was inserted in the "A" Experimental Hole of the F Pile on November 24 in order to study the shielding effects of this type rod guide.

The F Pile was operating at a maximum level of 65 M.W. at the beginning of the month because of the loss of reactivity occasioned by water which had leaked into the graphite from Tube No. 1569-F on October 20. The pile was shut down on November 1 and the flow of water to the process tubes was stopped in order to allow the fission product energy to heat the graphite in the wetted zone. As a safety precaution, thermocouples were placed under the metal of four tubes, Nos. 1586-F, 1987-F, 2670-F, and 2966-F, to monitor the tube temperatures in both the wet and dry zones; a water flow of 2,000 gpm for approximately one minute was introduced periodically through the unit in order to limit the maximum temperature in the tubes in the dry zone to 90°C. This method of operation was discontinued on November 4 at 12:35 a.m. as it became doubtful that sufficient monitoring

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points were available to assume absolute safety of the pile while operating in this manner. During the 43 hours of operation under these conditions, 106 gallons of water were removed by the Building 115-F dryers. Operation of the pile was resumed at 100 M.W. and the operating level was gradually increased as the water was removed until the nominal level of 275 M.W. was reached on November 14.

As of month end, 1050 gallons of water had been removed from the F pile and the rate of removal had fallen to approximately 8 gallons per 24 hours. A total of 457 ih. of reactivity had been regained as of month end, and this appears to be the total reactivity lost due to the water leak. A complete write-up of this incident may be found in Document No. HW-11715, (J. T. Baker to file).

The daily water recovery rate at 100-B Pile had dropped from a high of 45 pints at the beginning of the month to a normal of 20 pints by November 6.

On November 25, the effluent water monitoring equipment at the B Pile showed an increase in activity on the near side of cross header 4 $\frac{1}{2}$. Laboratory analysis of the water from this header confirmed the higher activity readings but failed to indicate any alpha or fission product contamination. Surveillance of this condition, however, was continued until November 30, the next regularly scheduled outage. At this time a survey of the pigtails and nozzles on this header revealed higher than normal readings on Tube No. 0569-B. Contamination smear samples of the rear Van Stone flange of this tube read 1200 mrep, including 5 mr/hr; this is about 10 times the normal reading and indicated that the metal of a slug had in some manner become exposed to the water. Analysis of the water from this tube showed low level alpha contamination. On the basis of this information the tube was discharged into a specially prepared chute and container to avoid spread of contamination. This tube had been charged since October 11 with 4" completely transformed, alpha rolled, triple dipped metal; it was recharged with aluminum dummies pending examination of the discharged pieces.

During the metal discharge of November 16, twelve tubes were discharged with difficulty at the D Pile. These tubes contained 4" alpha rolled, lead dipped pieces. Ten of the tubes were normally discharged after extensive oiling. The remaining two, 1467-D and 1480-D, were back-seated after oiling and then discharged with reasonably low forces. Both of these tubes were loaded with dummies pending replacement. Tube No. 1480-D was replaced and charged with regular metal on November 23.

MECHANICAL EXPERIENCE

All vertical and horizontal safety rods were in satisfactory operating condition at month end. Vertical safety rod No. 27 at the F Pile was out of operation part of the month due to binding between the rod guide and thimble. This defect was temporarily corrected by installing a new rod guide two feet shorter in length. The rod operated satisfactorily after this correction and was placed back in service. The pneumatic

*D. Allen
this month.*

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testing of all vertical safety rod thimbles at the D Pile was completed during the month with no leakage indicated in any of the thimbles.

The testing in normal operation of the trial electric drive on No. 4 horizontal rod at B Pile was continued throughout the month. In one instance, the rod reversed when an attempt was made to insert it. This condition was temporarily corrected by adjusting the relays. Meanwhile, a study is being made to determine what revisions of equipment are necessary to guarantee that the rod will not move in the reverse direction to that indicated by the control switch. Some galling was noted on the underside of No. 4 rod at B Pile and was caused by the rod rubbing on the liner plate of the sandwich wall between the inner and outer rod rooms. This condition was corrected by filing down the liner plate.

Six process tubes were replaced during the month as follows:

- (a) Tube 1480-D was replaced on November 23 after being discharged with difficulty on November 16.
- (b) Tubes 1586-F, 1987-F, 2670-F, and 2966-F, which had been used for monitoring tube temperatures (see Operating Experiences), were replaced November 4.
- (c) Tubes 3179-B and 2374-B, which had previously contained SR-15 pieces, were replaced during the month. This is in continuance of the program to replace all tubes which have recently contained SR-15 pieces.

*Debraen
for Doc.*

The program of inspection of Van Stone flanges was completed at D pile during the month. The results of this inspection will be used for a statistical analysis of the present status of the Van Stone flanges on the pile.

Special unit motion indication equipment was installed on the front and rear faces of the B and F Piles during the month, preparatory to the introduction of CO₂ into the pile atmosphere. The equipment for the CO₂ addition was also installed at both 115 Buildings during the month.

One cable of the transfer area crane at the D Pile partially pulled out of its clamp at the fixed end on November 23 while lifting a 6,000 pound cask. The slippage was not serious enough to drop the load, and repairs were made on November 26.

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The tie-in for the emergency raw water line for the DR pile was made during the D Pile outage of November 2.

All areas continued the control of algae growth in the 107 Retention Basin. The following steps were taken during the month:

- (a) Algae and sediment were removed from the south half of the 107-B basin and were buried. This completes the removal from both sides.

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- (b) A very heavy dosage of calcium hypochlorite was added to the water held in the north side of the 107-D basin with good results in killing the algae.
- (c) The effluent water was diverted to the east side of the 107-F basin during the month and at month end the west basin is in process of being emptied.

PILE DEVELOPMENT

Standard procedures have been revised to reduce the requirements for use of steam driven ventilating equipment during planned critical power conditions. The new procedure is the result of efforts to reduce steam costs and was inaugurated when investigation gave assurance that an adequate steam supply would always be available to run these fans in case of an emergency.

A new procedure for manipulating the heavy (6,000# class) casks was developed and instituted during the month. The use of chain hoists on yoke dollies eliminates the necessity for personnel to work on scaffolding over the water in the storage basins.

A flexible, jointed, vertical safety rod was designed and constructed during the month. This rod is being evaluated for use in the piles where the present rods bind in the rod guides or thimbles. An eccentric rod guide and stop plug are also being designed and will be evaluated for the same purpose.

GAS PROCESSING BUILDING

The dryer rooms at the F Pile were operated manually throughout most of the month in an effort to increase capacity and efficiency in the drying towers. Gas flow, which is normally 2,100 CFM, was increased to 4,100 CFM by using all five blowers at maximum speed. The 115-F Building was returned to normal operation when the water removal rate of the dryers dropped to approximately 8 gallons per day.

Work was continued on the dismantling of #2 purification and #2 Purge Blower room at 115-B. This equipment is to be used at 100-H Area.

SPECIAL HAZARDS

Conditions in the 115-F dryers during water removal were such that Chemox masks were required for protection. The water was removed from the dryers and placed in drums with no over-exposure to personnel although contamination to the extent of 3 rep/hr was encountered. The water, which contained S35 to the extent of 0.9 millicurie per liter, was buried. A total of 900 gallons of contaminated water was buried.

A consignment of B-material shipping containers was returned from the customer in a steel express car during the month. Pre-unloading surveys showed the boxes and car to be contaminated, which was not unexpected, but complete surveys of the car were not feasible because of the very dirty and disordered condition. The car contained about one inch sand, cinders, broken glass, and sawdust littered over the floor.

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More complete surveys, made after the boxes had been unloaded to a truck by fork lift, indicated that the boxes were grossly contaminated. It was further observed that the contamination had been spread to the fork lift, the truck, and the area where the work was performed. SWP clothing worn by personnel during the unloading operation was found to be contaminated beyond expectations based on past experience.

Alpha contamination readings greater than 3,000,000 d/m were detected on the outside of some of the boxes.

Surveys of the car (after vacuum cleaning and sanding) showed readings greater than 48,000 d/m on the floor, with the entire floor being contaminated, and readings up to 22,000 d/m on the wooden wall linings as high as three feet.

At month end, the boxes have been painted to fix the contamination and will be buried. The casks, less highly contaminated, will be painted and returned to service. The fork lift has been decontaminated and released. The truck will be decontaminated and released as soon as it is available. Handling of the express car has been held up pending a decision on means of rehabilitation. The ground area where the unloading was done has been cleaned, checked, and released except for a small area awaiting final surveys. In two small areas holes were dug in black top and new black top was applied to fix any contamination that might not be removed.

In all these operations there was no evidence of contamination of personnel or personal clothing.

300 AREA - METAL FABRICATION

Production Statistics

Production for the month of November was as follows:

Billets Produced	70 Tons
Rods Machined	203 Tons
Acceptable Pieces Canned	150 Tons

Melt Plant

The casting yields were as follows:

	<u>October</u>	<u>November</u>	<u>To Date</u> <u>1948</u>
Billet	65.2	66.7	67.9
Solid Material	83.0	84.3	85.9

The Melt Plant was operated on a three-shift, six-day week schedule until November 29. At that time the backlog of UM and TXB had been consumed and operation was reduced to a two-shift, six-day week schedule.

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After starting to process a Plant inventory consisting of 5000 pounds of TXB containing magnesium, by adding one briquette per crucible charge, it was noted that an increase in solid yield was realized. To evaluate the gain in yield a number (25-30) of crucible charges were melted using TXB free of magnesium, adding one briquette containing magnesium per charge, and adding two briquettes containing magnesium per crucible charge. The resultant yields indicated that approximately eight pounds of additional solid metal could be poured from each charge which contained magnesium. This represents a gain of about 1.5 percent in solid yield. The matter is subject to further evaluation.

Machining:

Machining yields were as follows:

<u>% Yield (4" A's)</u>		
<u>October</u>	<u>November</u>	<u>To Date</u> <u>1948</u>
63.6	69.1	68.6

A total of 50 slugs was machined to a diameter of $1.351 \pm .001$ " and a length of $4.036 \pm .010$ " in conformance with Production Test No. 313-107-M, Supplement A, (Effect of Canning Conditions on Slug Yield and Quality) on November 22. The machining of an additional 5842 slugs to a diameter of $1.352 \pm .002$ " and a length of $4.040 \pm .010$ " under the same test was completed on November 29. This test is intended to indicate the ideal machined slug dimensions to produce a canned slug of the standard dimensions.

Chip Recovery

The Chip Recovery yield was as follows:

<u>% Yield</u>		
<u>October</u>	<u>November</u>	<u>To Date</u> <u>1948</u>
90.6	92.0	91.2

The entire Chip Recovery Process was operated 14 eight-hour shifts and the press was operated an additional 23 eight-hour shifts. A total of 89,712 pounds of TXB was produced.

The press was shut down on November 3 to repair the center post of the die holder. Operation was resumed on November 4.

It was necessary to shut down the Chip Recovery Operation again on November 24 when excessive vibration developed in the centrifuge. The necessary repairs are scheduled for completion on December 1.

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The material burned in the oxide burner was as follows:

<u>Weight Out - Lbs.</u>		
<u>October</u>	<u>November</u>	<u>To Date</u> <u>1948</u>
22,153	20,309	115,523

The burner was operated on a three-shift, six-day week schedule until November 29; at that time operation was reduced to a two-shift, six-day week schedule to coincide with the Melt Plant which provides the operating personnel for the burner.

Canning Operation

The canning yield was as follows:

<u>% Yield (4" A's)</u>		
<u>October</u>	<u>November</u>	<u>To Date</u> <u>1948</u>
88.8	88.6	88.7

Canning rejects, by cause were:

	<u>% Total Canned (4" A's)</u>		
	<u>October</u>	<u>November</u>	<u>To Date</u> <u>1948</u>
Non-Seating	4.3	2.8	4.1
Marred Surface	2.1	2.7	1.7
AlSi on Outside of Can	0.4	0.5	0.9
Frost Test	1.2	1.9	1.3
Bad Welds	1.7	0.9	1.6
Miscellaneous	<u>1.5</u>	<u>2.6</u>	<u>1.7</u>
	11.2	11.4	11.3

A quality control program was started on November 9 in an effort to reduce non-seating and bad weld rejects. Three operators, one from each crew, were assigned to collect data on possible causes for these rejects. The Statistical Group is assisting in the analysis of data and the preparation of control charts. Thus far a significant reduction in non-seating rejects has been achieved. The reduction in bad welds has resulted mostly from the use of the alternate ($\frac{1}{2}$ ") caps, which are of a better quality than the stock previously used.

Frost test rejects were higher this month and were largely caused by the increased torque applied on the thick alternate cap during facing. The increased torque broke the bond between the can and slug near the cap on a number of pieces, which later were rejected at frost test.

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During the course of checking various suspected causes for non-seating, it was found that recovered slugs gauged as much as 0.004" larger in diameter than regular machined "A" slugs. Further investigation confirmed that slugs were increasing in diameter and becoming shorter in length during transformation from the alpha to the beta phase in the bronze bath. Fifty slugs that were machined to a diameter of $1.351 \pm .001$ " and a length of $4.036 \pm .010$ " were canned on November 22 under Production Test 313-107-M, Supplement A, (Effect of Canning Conditions on Slug Yield and Quality). Following canning and inspection, these pieces were recovered and average dimensions of the slugs were: Diameter 1.3578", Length 3.998".

A process change, reducing slug pickle time from $4 \pm \frac{1}{2}$ minutes followed by a 30-second repickle to a 1-minute pickle, was put into effect on November 24. The authorization for this change is contained in Document No. HW-11498.

The following special canning was done during the month:

<u>Request Number</u>	<u>Contents</u>	<u>Number of Pieces</u>
SR 65-2	Lithium Aluminum Alloy	127
SR 65-3	Lithium Aluminum Alloy	271

In addition, 2887 bismuth slugs and 1050 special lead slugs for segmented discharging in the 100 Areas were canned.

Recovery Operation

	<u>% Recovered</u>		<u>Average Wt. - Lbs.</u>	
	<u>To Date</u>		<u>To Date</u>	
	<u>November</u>	<u>1948</u>	<u>November</u>	<u>1948</u>
Z slugs	76.4	70.5	3.906	3.904
X Slugs	18.2	22.4	3.856	3.854
Rejects	5.4	7.1	--	--
	100.0	100.0		

Inspection and Testing

Autoclave rejects were as follows:

<u>October</u>	<u>November</u>	<u>To Date</u> <u>1948</u>
0.11/M	0.32/M	0.26/M

Twenty-three autoclave failures occurred in November. The chief cause for these failures was insufficient bonding around the cap.

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

	% Usable -- (1")		To Date 1948
	October	November	
Aluminum Cans	94.3	93.6	92.2
Aluminum Caps*	86.6	96.5	96.6
Steel Sleeves	90.9	51.5	83.9

* An alternate thick cap ($\frac{1}{2}$ ") was inspected and used during November as a result of the poor quality of the standard 4" caps reported last month.

Material Handling

Eighty tons of billets were shipped to Vulcan Crucible Steel Company and $7\frac{1}{2}$ tons of solid scrap (UM) were shipped to Los Alamos. Seventy-eight tons of rods were received from Vulcan Crucible Steel Company and 141 tons from Simonds Saw and Steel Company (Lockport).

305 Area Test Pile

This unit was operated 21 eight-hour days in November. One hundred thirty-two tests were run on canned slugs, 114 on billet eggs, 334 on graphite bars, and the following on special work requests:

<u>Request No.</u>		<u>No. of Tests</u>
39	To irradiate an indium foil for cross-section of counters.	1
40	To determine the absorption cross-section of "PM-90" descaler for use in DR construction.	2
41	To obtain absorption cross-section of SR-65 slugs.	7
42	To obtain absorption cross-section of "Zarball" cleaning fluid for use in 101 Building.	4
43	To obtain absorption cross-section for a piece of magnesium-aluminum alloy for possible use in 105 Areas.	4

Special Hazards

A resurvey of radiation exposures to personnel in the Melt Plant made during the month showed that hand exposures average about 500 mrep, with a maximum of 850 mrep. This is below the allowable hand tolerance of 1000 mrep/week. However, since these readings are higher than the photo-badge readings, which have been consistently less than 300 mrep during the past several weeks, it is planned to repeat this survey at

P Division

regular intervals. In addition, it is expected that radiation exposures will be reduced appreciably when the Melt Plant operating schedule is reduced from a six to a five-day week on December 20.

It is now apparent that the reduction of air contamination in the Melt Plant is partially dependent on the filtering of air from the cyclone separators. Sand filters are being designed for this purpose. Work is progressing on the design and preliminary preparations for the installation of exhaust systems for furnaces, and the various rooms in the Melt Plant.

The dike on the old retention pond was reinforced early this month and process water was diverted to the new pond on November 14.

Development

A number of trial runs was made during the month to determine the feasibility of burning out crucibles in the Melt Plant by induction heating. Crucibles were heated both upright and inverted, under vacuum and at atmospheric pressure, inside the furnaces. It was found that vacuum retarded burnout and crucibles heated under atmospheric pressure with an energy input of 50 KW for fifteen minutes could be satisfactorily burned out in an inverted position. Burnout in an upright position could not readily be accomplished if large amounts of oxide and free metal were held up in the crucible after pouring.

A cast iron mold having an inside diameter of 4 1/8" was fabricated and tried in the Melt Plant to determine if materials other than graphite could be used for molds. The original billet poured in this mold on November 5 was satisfactory and it was easily removed since there was about 1/16" clearance between the billet and mold after cooling. The Zirconite coating inside the mold remained intact, which indicated a negligible amount of iron contamination. When the mold was tried a second time on November 15, a strip of cast iron from the lower end of the mold was found brazed to the billet upon removal. It is planned to make other tests on Meehanite and seamless steel molds as soon as they can be fabricated.

The operating time for bronze furnaces between shutdowns for overhaul was extended approximately 50 percent over last month through the following changes in the assembly and operation:

- a. The steel ring on the outside of the crucible was made deeper to permit the use of additional packing and improve the seal around the top of the crucible.
- b. A 4" steel ring was welded to the top furnace ring, extending down inside the crucible. This tends to prevent flux from being splashed over the top of the crucible by the mechanical agitator.
- c. The temperature of the furnace elements is reduced as much as is practicable when bronze furnaces are not in use.

END

DATE FILMED

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