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**Pacific Northwest Laboratory
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January 7, 1953

This document consists of
3 pages, [REDACTED]

COPY 1 OF 1, SERIES MA

PROCESS TEST MS-235-5

Reduction of Task III Cooling Time. RM Line

Objective:

The object of this test is to confirm, by actual Task III operation, the calculated theory that the furnace cooling period can be appreciably shortened by lowering the furnace base onto the detents at 400°C. instead of at 200°C. as at present. If the feasibility of this change can be established, Task III will no longer be a "bottleneck" and a considerable amount of effort and expense involved in revamping the Task III conveyor can be avoided.

Basis:

The present cooling cycle (about 2½ hours) is concluded when an indicated furnace temperature of 200°C. is reached. The charge is then lowered onto the detents for further cooling. Essentially, this means the furnace is now vented to the atmosphere. The main purpose of the presently used 2½ hour furnace cooling period is to make certain all free calcium is in the solid state. The secondary purpose is to minimize iodine vapors and thus reduce hood corrosion. The following information indicates that 2½ hours in-furnace cooling is excessive:

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1. Since the inside furnace temperature is approximately 1800°C. after "firing" and the rate of cooling is estimated to be 400 - 500°C. for the first five minutes, the slag, plutonium metal, and calcium are undoubtedly in the solid state fifteen minutes after "firing".
2. The amount of calcium iodide on the exposed surface of the slag that could release elemental iodine through oxidation is very small.

The shorter cooling period recommended appears adequate to meet the demand of quality control and safety of operation. Advantages derived from a shorter cooling cycle are:

1. It will be possible to process from fifteen to twenty runs per twenty-four hours on Task III, RM Line which now has an output of from eight to ten runs per twenty-four hours. This will balance fairly well with Task II production.
2. The proposed fabrication and installation of a revised ram-conveyor system, which will make possible the processing of fifteen to twenty runs for Task III, RM Line, will not be necessary for the reason given in (1) above. The shorter cooling period will eliminate an expenditure of approximately \$5,000 - the cost of altering the conveyor.

Procedure and Schedule:

In this test, a stepwise increase in the ram lowering temperature will be made until the higher temperature of 400°C., which appears entirely feasible, has been reached.

Twenty runs will be processed in accordance with this test. The test will be completed within two weeks of the issue date and an evaluation report circulated.

The normal process cycle will be followed with the following exceptions:

1. Five runs, using a temperature of 300°C.
Five runs, using a temperature of 350°C.
Ten runs, using a temperature of 400°C.
2. Vent and lower the furnace base onto the detents.* Cool the charge in this position for at least forty-five minutes before unloading.

* The furnace pressure must be 50# psi or less before venting.
3. The elapsed time between "firing" and lowering to the detents must be a minimum of fifteen minutes.

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Responsibility:

The Process Unit will be responsible for making observations and analyzing the results. The Operations Unit will be responsible for scheduling and making the test runs. Conclusions will be drawn jointly by the Operations and Process Units of the Separations Section.

Issued by C. L. Brown / 1/7/53

Process Unit

Date of Issue 1/7/53

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