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PRODUCTION TEST 231-16  
SINGLE PEROXIDE PROCESS

A. E. Smith  
Z-Plant Process Technology  
Separations Technology Section  
by R. A. Pugh

Classification Cancelled and Changed To

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### INTRODUCTION

The present isolation procedure for producing plutonium nitrate AT solution from T-Plant F-10-P solution consists of two plutonium peroxide precipitations, followed by evaporation of the second cycle cake solution to around 400 grams per liter for loading into the shipping container. The customer (Dow Chemical Company, Rocky Flats Plant) performs a third peroxide precipitation for coupling to the dry chemistry phase of the metal production process.

### OBJECTIVES

The objective of this production test is to show that it is practical to eliminate the second peroxide precipitation performed to isolate plutonium from F-10-P solution for off-site shipment.

### BASIS

Production Test 234-3<sup>(1)</sup> and supporting laboratory work<sup>(2)</sup> has demonstrated that satisfactory metal can be produced from F-10-P solution by performing only two peroxide precipitations, with the second cycle cake going directly to hydrofluorination. One precipitation is necessarily performed at Rocky Flats for coupling to the dry chemistry operation, and the possibility is presented that one of the two precipitations performed at this site may be eliminated.

The purification obtained by precipitation depends, in part, on the efficiency of washing. For a two cycle process, data (2, 3) indicate that between three and six washes are required for the first cycle precipitation. Wash composition appears to have little effect, and for this test 6 to 9 per cent nitric acid will be used.

The customer has indicated his willingness to cooperate with HAFO in this series of tests<sup>(4)</sup>.

### PROCEDURE

Present 231 Building operating procedures will apply for all steps not otherwise altered in the items below.

The production test will be divided into a series of tests, each to contain twelve standard runs which will be shipped to the customer as a lot. The results from each test will be evaluated before a succeeding test is made to determine what changes in procedure outline are indicated. Procedure changes which might be anticipated could include increasing or decreasing the number, volume, acidity, and residence time of washes.

The first test will consist of twelve runs using standard first cycle procedures except that three eight-liter washes, using 6 per cent nitric acid, will be used. The minimum slurry volume after each wash will be two liters.

### DATA

In addition to routine analyses, including AT purities and sample can radiation

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levels, the following data will be required:

1. Spectrographic analyses of the AT solution.
2. Total volume before and after each decantation, and the final supernatant and wash volume of each run.
3. The elapsed time for addition, digestion, and settling for each wash.
4. Data on final metal purity (to be furnished by Rocky Flats).

EQUIPMENT

No changes in present equipment will be required.

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ACCOUNTABILITY

This production test will not affect accountability procedures.

RESPONSIBILITY

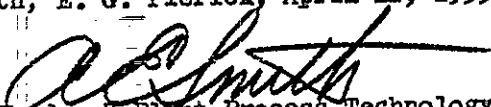
The Separations Section will have the responsibility for making the test runs and will furnish run books, and collect all data at this site. The Z Plant Process Technology Unit will maintain liaison with the Dow Chemical Co., Rocky Flats Plant, for data on final metal purities, and will be responsible for the outline of test procedures. Final evaluation of the test results will be made jointly by the Separations Technology Section and the Separations Section.

ESTIMATED COMPLETION

Tests will be started immediately upon approval of this Production Test. Estimated completion for the first test is July 1, 1955. Additional tests will be evaluated approximately two months after they are carried out in the 231 Building. The program should be completed not later than January 1, 1956.

REFERENCES

- (1) HW-22802, "Final Report Production Test 234-3, Process Evaluation Hydrofluorination of Plutonium Peroxide", W. B. Kerr, November 15, 1951.
- (2) HW-21751, "The Use of Plutonium Peroxide for the Preparation of Plutonium Tetrafluoride", W. L. Lyon and B. Weidenbaum, July 26, 1951.
- (3) Memo Report SE-PC-#41, G. W. Watt, May 28, 1945.
- (4) HW-36172, "Trip Report: Rocky Flats and Los Alamos Scientific Laboratory-February 28 to March 4, 1955", A. E. Smith, E. G. Pierick, April 12, 1955.

  
Head - Z Plant Process Technology  
Separations Technology Section  
ENGINEERING DEPARTMENT

AE Smith/RAP:efg

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APPROVALS

O. F. Hill, Manager, Plant Processes  
O. F. Hill

Date 4-28-55

W. N. Mobley, Superintendent, Z Plant  
W. N. Mobley

Date 5/2/55

R. B. Richards, Manager, Separations Technology  
R. B. Richards

Date 5/5/55

R. S. Bell, Manager, Separations Section  
R. S. Bell

Date 5/10/55

J. E. Maider, Manager, Manufacturing Dept.  
J. E. Maider

Date 5-17-55

D. G. Sturges, Atomic Energy Commission, HOO  
D. G. Sturges

Date 5-18-55

Date Issued May 19, 1955

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