

# MONSANTO RESEARCH CORPORATION

MOUND LABORATORY

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MOUND LABORATORY-MONSANTO  
CENTRAL FILE NO. 66-8-98

Mr. N. H. MacKay, Director  
Nuclear Materials Management  
U. S. Atomic Energy Commission  
P. O. Box 5400  
Albuquerque, New Mexico

Dear Mr. MacKay:

## June, 1966 Plutonium-238 MUF Losses

The June, 1966, Material Balance Report page 17, footnote 7, reported in Material Balance Account 200 a (MUF) loss of 154.9 grams and in Material Balance Account 300 a (MUF) loss of 38.5 grams. This letter is to provide an explanation and insight into the factors which contributed to the (MUF) losses in MBA 200 and MBA 300. The (MUF) losses in Accounts 100, 400, and 500 are considered normal for the operations.

Five significant cases, which contributed to these (MUF) losses, are explained herein. These losses were partially compensated for by (MUF) gains in the June, 1966, Material Balance Report. In two cases further (MUF) gains are to be expected.

In the following explanations, the isotope value only is given to improve the clarity of presentation.

### Case #1 MBA 200 Loss

Room 38, Tank 7-A, Account 238

This tank held two liters of nitrate solution which was received in August, 1965, from R Building. This material has been in dead storage until June 28, 1966, when it was sampled for the June Physical Inventory. The material has apparently precipitated and was coating the walls of the tank. Nitric acid was added to redissolve the material and is expected to return the material to solution. An MUF gain may be experienced at a later date.

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MOUND DECLASSIFICATION REVIEW	
DATE	02/14/66
BY	CHAC ERDC DADD
REVIEW DATE	7/13/01
AUTHORITY	ERDC
NAME	Bob Atkey
DETERMINATION (CIRCLE NUMBER(S))	
1. CLASSIFICATION RETAINED	
2. CLASSIFICATION CHANGED TO	
3. CONTAINS NO DOE CLASSIFIED INFO	
4. COORDINATE WITH	
5. CLASSIFICATION CANCELLED	
6. CLASSIFIED INFO BRACKETED	
7. OTHER (SPECIFY):	

~~GROUP 1~~

~~SECRET~~

~~RESTRICTED DATA~~

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The value determined by alpha counting and volume measurement was 3.48 grams. The original book value from August 1, 1965, was 31.95 grams. Calculation of the MUF loss is as follows:

<u>Value</u>	<u>Date of Value</u>	
31.95 g	7/1/65	Transfer to Recovery
31.67 g	7/1/66	Book Value decayed to current date
<u>3.48 g</u>	7/1/66	Physical Inventory based on new measurements
(MUF) 28.19 g	7/1/66	MBA 200 Loss

Case #2 MBA 200 Loss

Room 38, Digester System, Account 238

Material was added to the digester in small units until the total accumulated to 81.02 grams on the May 31, 1966 Physical Inventory. On June 8, 1966, the clear liquid was analyzed and transferred to Room 59 at a value of 38.76 grams. The residue liquid was allowed to settle and for the June Physical Inventory was sampled and analyzed at 4.32 grams.

The remaining material, contained in the undissolved residue in the digester, is currently being dissolved. An MUF gain is expected at a later date. Calculation of the MUF loss is as follows:

<u>Value</u>	<u>Date of Value</u>	
81.02 g	6/1/66	Accumulated total
80.98 g	7/1/66	Decay calculation
<u>38.76 g</u>	7/1/66	Transfer 6/8/66
42.22 g	7/1/66	Book Balance
<u>4.32 g</u>	7/1/66	Remaining Liquid Residue
(MUF) 37.90 g	7/1/66	MBA 200 Loss

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Case #3 MBA 200 Loss

Room 38, Recovery Lot MS-21, Account 238

Recovery Lot MS-21 was composed of several Ion Exchange Batches transferred in June from Room 59 (Low Recovery) to Room 38 (High Recovery) for storage. The sum of the individual batches determined by alpha counting and volume measurement, was 856.38 grams as of 6/1/66. It was reanalyzed in Room 27 and transferred at a value of 745.23 as of 6/1/66 to MBA 300. The difference between the total of batch measurements and total lot measurement is due to the inaccuracy in volume measurement and the limits of error in alpha slide mounting. Batch measurements are made under less stringent requirements than the final MS-Lot analysis due to the position in the process line and equipment available to measure volumes. The volume determination in Room 59 was by sight gauge which can introduce an undetermined error. The volume determination in Room 27 was by a tension-type load cell equipped with a digital-readout potentiometer with an accuracy of 0.1%.

The total loss was reported as a loss on MS-21 rather than individual batch corrections due to its reanalysis and new volume determination. Calculation of the MUF loss is as follows:

<u>Value</u>	<u>Date of Value</u>	
856.38 g	6/1/66	Batch measurements
<u>745.23 g</u>	6/1/66	Lot measurements
111.15 g	6/1/66	Difference
(MUF) 111.08 g	7/1/66	MBA 200 Loss

Summary of Significant Losses in MBA 200

<u>Case</u>	<u>Value</u>	<u>Date of Value</u>	
#1	28.19 g	7/1/66	(MUF) Loss
#2	37.90 g	7/1/66	(MUF) Loss
#3	<u>111.08 g</u>	7/1/66	(MUF) Loss
Total	177.17 g	7/1/66	(MUF) Loss

Summary of Significant Gains in MBA 200

<u>Account</u>	<u>Value</u>	<u>Date of Value</u>	
238	(10.94) g	7/1/66	(MUF) Gain
259	<u>(12.27) g</u>	7/1/66	(MUF) Gain
Total	(23.21) g	7/1/66	(MUF) Gain

Other Insignificant (Small) Gains & Losses and Rounding in MBA 200

<u>Value</u>	<u>Date of Value</u>	
0.94	7/1/66	(MUF) Loss

Difference Between Losses & Gains

<u>Value</u>	<u>Date of Value</u>	
177.17 g	7/1/66	Total (MUF) Loss
(23.21) g	7/1/66	Total (MUF) Gain
<u>0.94 g</u>	7/1/66	Total (MUF) Loss
154.90 g	7/1/66	Grand Total reported on June MBR

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Case #4 MBA 300 Loss

Room 38, MS-20, Account 301

Recovery Lot MS-20 was composed of several Ion Exchange batches from Room 59 which were combined and sent to Room 38 for storage. The solution could not be physically transferred to Room 27 (Account 301, Receiving and Storage) due to a long term contamination problem in Room 27. Since this was considered feed material, it was transferred in the records to Account 301 at a book value of 659.06 grams as of 6/1/66. Subsequently, it was physically transferred to Room 27 and measured therein. The explanation of the measurement difference is the same as stated in Case #3. Calculation of the MUF loss is as follows:

<u>Value</u>	<u>Date of</u> <u>Value</u>	
659.06 g	6/1/66	Batch measurements
<u>597.38 g</u>	6/1/66	Lot measurement
61.68 g	6/1/66	Difference
(MUF) 61.64 g	7/1/66	MBA 300 Loss

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Case #5    MBA 300 Gain

Room 38, MS-19, Account 301

Recovery Lot MS-19 was stored, transferred, measured, etc., in the same manner as MS-20 Case #4 listed above. Calculation of the MUF Gain is as follows:

<u>Value</u>	<u>Date of Value</u>	
655.80 g	6/1/66	Batch measurements
<u>679.22 g</u>	6/1/66	Lot measurement
(23.42) g	6/1/66	Difference
(MUF) (23.40) g	7/1/66	MBA 300 Gain

Summary of Gains and Losses in MBA 300

<u>Case</u>	<u>Value</u>	<u>Date of Value</u>	
#4	61.64 g	7/1/66	(MUF) Loss
#5	(23.40) g	7/1/66	(MUF) Gain
	<u>0.26 g</u>	7/1/66	Rounding & Small MUF Loss
	38.50 g	7/1/66	Total MUF Loss reported on June MBR

Please do not hesitate to advise me if you have any further questions regarding these losses.

Very truly yours,



M. N. Wolfe  
SS Representative

MNW/bg

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- Distribution:
1. N. H. MacKay, ALO
  2. W. B. Creamer, attn. E. A. Walker, DAO
  3. W. B. Creamer, attn. E. A. Walker, DAO
  4. D. L. Scott
  5. J. E. Bradley
  6. F. M. Huddleston
  7. W. R. Deal
  8. M. N. Wolfe
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