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MOUND LABORATORY
OPERATED BY
MONSANTO CHEMICAL COMPANY
MIAMISBURG, OHIO

MOUND LABORATORY-MONSANTO
Central File No. 52-7-10

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PROGRESS MEMORANDUM

May 16, - June 13, 1952

CONTROL SECTION

Abstract

Group 20

One hundred nine purity determinations were made, five resamples were required.

Seventeen bismuth analyses and four chloride analyses were made.

Four modified thermal control cylinders were ordered from the machine shop this will overcome the wide difference in tare weight of the cylinders in present use (due to their varying designs).

Group 22

The technique of mounting alpha slides was reviewed and resulted in improving the alpha count precision.

Group 24

Neutron counting for all Pots and some Cells is being accomplished with the T-29 geometry against the Los Alamos "A" standard.

All operations were sustained without any undue irregularity.

An additional five tank methane storage rack was added in room T-307.

MOUND LABORATORY CLASSIFICATION REVIEW	
1ST REVIEW DATE: <u>9/18/97</u>	DETERMINATION (CIRCLE NUMBER(S))
AUTHORITY: <u>DAOC DAOC DADD</u>	1. CLASSIFICATION RETAINED
NAME: <u>T.M. FLANNERY</u>	2. CLASSIFICATION CHANGED TO _____
2ND REVIEW DATE: <u>1/12/98</u>	3. CONTAINS NO DOE CLASSIFIED INFO
AUTHORITY: <u>ADP</u>	4. COORDINATE WITH _____
NAME: <u>R. Ratay</u>	5. CLASSIFICATION CANCELLED
	6. CLASSIFIED INFO BRACKETED
	7. OTHER (SPECIFY): _____

~~GROUP 1~~
Excluded from automatic
downgrading and
declassification

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~~Restricted Data~~

This document contains restricted data as defined in the Atomic Energy Act of 1946. Its transmittal or the disclosure of its contents in any manner to an unauthorized person is prohibited.

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Group 33

The report on the neutron problem was finished, edited and is being typed for distribution.

The scope of this group's activities was re-defined in a discussion between the group, Dr. Rembold and Mr. Lowry.

DETAILED REPORT

Group 20 - Electrolytic Purity Assay

Of the 109 products assayed during this period, 5 required re-sampling. To date this year 618 products have been run; 19 or 3.07 per cent have been resampled.

Seventeen bismuth analyses were made for Mr. H.F. Anson and Mr. R.W. Endebrock. Four chloride analyses were made for Mr. H.F. Anson.

PERSONNEL

Mr. B.E. Baughn was on vacation for one week and returned to work June 16, 1952.

Mr. B.E. Baughn and Mr. A. Elmlinger attended the two final statistics seminars given by Dr. Astracan.

EQUIPMENT AND MAINTENANCE

One foil was lost and recovered from Balance #3.

During this period, all three balances were given routine service.

Hoods #1, 2, 3, 4, and 5 in T-260 were decontaminated and painted this period.

DEVELOPMENT

Colorimetric Determination of Silver in Low Concentration in Bismuth

The installation is complete except for the installation of the glass vacuum line.

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Macro-Assay Method Development

On the basis of the results reported on May 14, it was decided to set up an experiment with specified goals. The aim was as follows:

- (1) All results to be between 80 and 110% purity.
- (2) 68% of all weighings to give purities within $\pm 3\%$ of their average.
- (3) 95% of all weighings to give purities within $\pm 6\%$ of their average.
- (4) 99% of all weighings to give purities within $\pm 9\%$ of their average.

Seventeen purity determinations were made. The results are presented in Table I. The comparison of performance with goals was as follows:

<u>Specification</u>	<u>Goal</u>	<u>Performance</u>
80 to 110% purity	17	13
$\pm 3\%$ range	12	10
$\pm 6\%$ range	16	17
$\pm 9\%$ range	17	17

Four of the results (two on each of two days) ranged from 110 to 116 per cent. All four of these high results occurred for guns which were flushed out with helium prior to the hot weighing on two separate days. No excessively high purities were noted on guns weighed on the other two days, when vacuum only was employed between plating and weighing. The rest of the goals were met more closely.

Four weighings were of XY guns. (See Table I) The results continued erratic, though for the first time a high purity (over 100 per cent) was obtained on one determination.

Except for cylinders 3 and 4, which are alike, all the thermal control cylinders differ rather widely in construction and in tare weight, ranging from 59 to 84 grams. Four new cylinders embodying the desirable features from our present cylinders have been designed and ordered from the machine shop.

Further work will await the completion of the new cylinders.

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TABLE I
MACRO PURITY DATA

Plating Date	Ampule	Neutron Count n/s/curie	Cal. Value	Weight	Micro Purity	Macro Purity
5-20-52	Y-1768	435.4	22.96 C	5.17mg	91	98.8
"	"	"	"	4.89	"	104.4
"	"	"	"	4.90	"	104.3
"	"	"	"	5.03	"	101.6
"	"	"	"	5.25	"	97.3
"	"	"	"	5.05	"	101.2
"	"	"	"	5.09	"	100.4
5-21-52	Y-1788	104.7	26.77 C	5.12mg	94	116.3 ¹
"	"	"	"	5.24	"	113.7 ¹
"	"	"	"	5.64	"	105.6
"	"	"	"	5.56	"	107.1
5-22-52	Y-1800	747.5	28.68 C	5.58mg	96	114.4 ¹
"	"	"	"	5.93	"	107.6
"	"	"	"	5.96	"	107.1
"	"	"	"	5.97	"	106.9
"	"	"	"	5.79	"	110.2 ¹
"	"	"	"	5.91	"	108.0
5-19-52	XY-763	82.2	6.60 C	2.48mg	93	59.2
"	"	"	"	1.75	"	84.0
5-21-52	XY-781	118.0	8.94 C	2.79mg	97	61.3
"	"	"	"	1.89	"	105.3

1 - Cylinders flushed with helium prior to hot weighing.

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Group 22 - Inventory

Operations

The major efforts of the Group during this period have been directed toward an effort to find the reason for the serious lack of agreement between duplicate assays of the same sample using the dilution and Bradley counting methods. The cooperation of the Research Division was secured in an effort to get at the cause of the trouble; they provided an operator to run samples along with Inventory personnel in the "T" Building and also to run duplicate samples in the "R" Building. This enabled us to reduce the controlling factors one by one until we arrived at the dilution and mounting techniques in use by the Inventory Group; this was the source of the trouble. Probably the biggest single cause of the inaccuracies was the result of a speed-up in the dilution and mounting operations; this was particularly serious in the case of hurried emptying of the micropipettes. Rapid manipulation of the controller tends to leave droplets clinging to the sides of the pipette itself which should be delivered either to a dilution flask or to a slide mount. This accounted for slide values below a known value which were difficult to explain satisfactorily. The reason for this relaxation in technique can best be explained in terms of morale considerations. The operators involved have been engaged in this particular type of work for upwards of four years without assignment to other jobs to break the monotony; they had reached a state of mind where they felt the job they were doing and the results obtained were of little interest to anybody else. Recognizing this attitude, it is not difficult to understand that the tendency is to perform required duties as speedily as possible.

The situation as outlined has not proved to be difficult to correct; once the source of the trouble was discovered and explained to the operators, the trouble cleared up immediately. Three check runs have been made since in which each of three solutions was diluted six times and three slides mounted from each dilution. The standard deviations from each set of eighteen slides were 360, 304, and 332. Averaging these at 332, the results show that 95 per cent of the time such slides will fall within a range of 664 counts. This is eminently satisfactory counting and seems to be well within the capabilities of the Inventory Group. The situation will be watched carefully in the future.

Following the solution of the counting difficulties, a solution was sent to calorimeter for assay and Logac and Bradley slides prepared to check the calibration of the instruments. The solution was assayed calorimetrically at 3.92 curies; Logac-S assay results were 3.936 curies. The situation was not so happy under the Bradley assay - results here gave an average from fifteen slides made from five dilutions counted on three instruments of 57,505. The result expected from the calorimetric assay is 54,390. Dilution and mounting techniques were satisfactory as standard deviation on the 45 counts was 335. This indicated that the Bradley results

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are more than 5 per cent high as reported from the Inventory Group and is in direct contradiction to previous checks with the Bradley instruments. If the correction factor now being applied by the Counting Room is dropped, the results fall within about 2 per cent of the calorimeter value. At the time the correction factor was adopted no reason could be found as to why it was necessary; again no reason is immediately discernable for the changed conditions now in evidence. The Research Division has agreed to assay the solution by slide-mounting techniques also; results will be reported as available.

During the month, a request was received from the local A.E.C. Office that future monthly production summaries contain a list of those depleted urchins destroyed during the month. The list is to be brought up-to-date by including in the June report all items previously destroyed. Arrangements have been made with the Y-Section to supply the data necessary to enable them to comply with this request. Since this information is directly available to the Inventory Group, it was agreed that we would write this section of the report monthly even though it is to be included with the Y-Section data.

The Inventory Group was visited during the month by an A.E.C. auditor attempting to reconcile our stock card record of precious metals with those of the Accounting Section. This is usually a somewhat complicated task due to differences in methods of accountability. In the interest of improving relations between Monsanto and the A.E.C., it is planned to hold some meeting with the Accounting Section in an effort to arrive at a common method of accountability for this material.

DEVELOPMENT

The series of lectures on Statistics in which the group was interested was concluded on June 3rd with the second of two lectures on Quality Control provided by Dr. Astrachan from Wright Field. The series has been well-received; this is particularly true of the four hours devoted to Quality Control. During his visit, Dr. Astrachan ventured the opinion that it might be possible to arrange for a regular course in Statistics at Mound through the Ohio State University provided sufficient interest exists. The matter is being considered by Mr. Waldfogle with Mr. Storey of the Personnel Division and Mr. Bersuder, but as yet no decisions have been reached, nor has Mound management been approached with the idea.

Group 24 - Calorimetry and Counting

Operations

The anticipated change in gauze shipment specifications has been

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made effective and will apply to the first June shipment and the following shipments. It appears that it will be possible to make the changeover with almost no reworking of activity on finished gauges, since only a few gauges which fail to meet the new specifications will remain in the stockpile.

The stockpile at the end of the period included enough finished guns and gauges to meet shipping requirements through the first half of July.

The Y-Section has requested that the two gun transfers to them scheduled for the month of July be moved up one week. At present it appears that this can probably be done, considering the present stockpile and current plating plans.

Calorimetry equipment operated without breakdown during the whole of the period. The water still operated by Group #24 had to be cleaned out, the still having reached the condition where it was not possible to obtain consistent purity meter readings under three parts per million on the distillate.

The electronic counting equipment in T-318 has required an unusual amount of servicing during this period. This was especially true of the Y-Type neutron counters including the counter setup used with the T-29 geometry recently received from Site Y.

It has been determined that the variations in background count on the T-29 geometry are considerable greater than those normally obtained on our old Y-type neutron counters. Also these variations are of such a magnitude that they may account to a large extent for the inconsistencies observed in the operation of this counter. During most of this period (since May 19) all neutron counts on finished initiators reported to the Y-Section have been based on the Site Y neutron counting standard (Ra - Be "A Source", S/N E -969). The T-29 geometry is being used to count Pots at the present time. It may be possible to handle the counting of both Pots and Cells on the T-29 once the counter has been permanently located and the cross-check runs discontinued. The future installation of the second T-29 geometry will accomplish the complete replacement of the old Y-type neutron counters.

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In addition to the regular production work the following assays were made for other groups during this period:

<u>No.</u> <u>Assays</u>	<u>Type</u> <u>Sample</u>	<u>For</u> <u>Group</u>
1	Prod. Gun	Physics
5	Prod. Gun	Micro - Assay
6	Prod. Gun	Neutron Source
5	Neutron Source	Neutron Source
1	Active Solution	Inventory

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P. J. Lowry

Copy 1 - Mr. E. C. McCarthy
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