





~~CONFIDENTIAL~~

[REDACTED]

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MONTHLY PROGRESS REPORT OF THE CHEMISTRY AND METALLURGY DIVISION

June 1, 1945

The processing of plutonium as received from W is going smoothly. In spite of wide variations in the product as received both in regard to impurities (such as silicon, phosphorus, tin, iron, chromium, nickel, platinum) and oxidation state (present material is about 50% plutonyl nitrate), the wet purification is working well and giving an excellent product, with yields usually only a few percent below the expected 95 to 98%. The reduction of the fluoride continues good, with yields of 98 to 99% depending on the quality of the fluoride supplied. In dry chemistry, a new oxalate ignition cycle and HF procedure has greatly reduced the treatment time required and improved the fluoride produced.

Four attempts to fabricate pure plutonium into 2" diameter hemispheres (630 g) met with failure. The large volume change on transformation from gamma or beta to alpha on cooling after hot pressing invariably resulted in cracks and warping of the diametrical plane. This difficulty was not encountered in 2" diameter 600 g cylindrical discs, and could probably be overcome in hemispheres by directional transformation. Because of the greater efficiency expected from a low density Christy gadget, the decision was made to concentrate on delta plutonium -- which also promises to be free from fabrication trouble associated with volume change after pressing. The alloy of plutonium with 3% gallium after suitable homogenizing treatment is readily retained as delta phase at room temperature, is quite malleable either at room temperature or at temperatures up to 400°C and has proven to be quite stable under any reasonable conditions of treatment.

Our losses of plutonium as determined by inventory are now running about 1% of the amount processed. While this is a considerable improvement over earlier

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- 3 -

work, we still hope for a reduction in losses by an order of magnitude. The study of losses is greatly complicated by the fact that our assay methods have uncertainties of 0.2 to 2%, so that actually the 1% loss may very well not be real. We now believe almost 0.5% (or half the apparent loss ) may be attributed to changes in concentration of samples prior to analysis due to the decomposition of water by the 49 alpha-particles. This error will be kept to a minimum in the future.

Group CM-11 completed the fabrication of 38 kg of 25 into the form of cubes for experiments at Omega. The processes for casting and machining gun target and projectile rings and for the bolt have been completely developed and as soon as the cube material has been reconverted, fabrication of final projectile rings will start.

DC  
b(3)

This work will be found in the report of CM-6, along with studies on electroplated protective coatings, which are by no means unpromising. Many advances are being made in our knowledge of polonium, an element in some

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respects newer than plutonium. In this regard the report of group CM-15, particularly jobs 5 and 12, will be found very interesting.

From the report of group CM-14 it will be noted that RaLa separation difficulties mentioned last month have been solved by a modification of the chemical process and by mechanical improvements. Yields of 85% are now consistently achieved at 500 curie level.

J. W. Kennedy

C. S. Smith

R. W. Dodson

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GROUP CM-1 MONTHLY REPORT -- R. F. Dunlap, Group Leader -- June 1, 1945

JOB AND PERSONNEL

PROGRESS

2. General safety

Chemistry and Metallurgy Division Safety Committee (Hammel, Hempelmann (A-G), Hinch, Kershaw (A-12), Dunlap)

The regular monthly meeting of the committee was postponed until Mr. F. Y. Pittman, newly appointed safety coordinator of the CM division, can be present. Group CM-12 has reported satisfactory operation of the glass wool hood filters. In view of the satisfactory operation of the filters, and the necessary delay in obtaining electrostatic units, no change will be made in the filter set-up of D-152 purification. The outside pit and electric hoist for the safe deposit of special solutions from D-502 has been completed. All technical work in D building was suspended for 24 hours on May 28, 1945 to enable a thorough cleaning of the building and surrounding areas. Much equipment (not in active use) was moved to the warehouse recently assigned to the CM division. Similar cleanup programs are planned for all other areas occupied by the CM division.

A special meeting of the committee was held May 7, 1945 to discuss safety measures at DP Site. Messrs. Pittman, Van Winkle, and Veltman represented DP Site. The committee agreed:

1. That geophone installations should be made in D building and DP Site to check the shock from HE explosions. This matter is being followed by Mr. Kershaw who will report his findings to the committee. Mr. Kershaw suggested this matter be followed with all diligence due to the high amount of fragile glass ether-containing apparatus.
2. That the contemplated amount of CO<sub>2</sub> to be used in conjunction with the ether hoods at DP be increased by a substantial factor. Van Winkle and Pittman to follow this item.
3. That Pittman further investigate the ether disposal problem as outlined in the memorandum from Rogers.
4. That a letter be written to Burke from the committee to the effect that the committee recommends the emergency wiring layout as described by Veltman, i.e.; a system including lighting and an arrangement whereby all hoods will be maintained at about half normal air velocity output, and that a good and reliable auxiliary power supply be made available to the emergency circuits, preferably a steam operated generator at the Site, and that the committee recognizes a great hazard in even brief power shut downs. The capacity of such an emergency outfit would probably not exceed 15% of the total peak power requirement of the Site. (This letter was written and delivered on May 8.)

3. Light contamination control

This work has been discontinued as a special problem, although the procedures developed will, in the main, continue to be followed

Hill





GROUP 10-2 MONTHLY REPORT -- [redacted] -- June 1, 1945

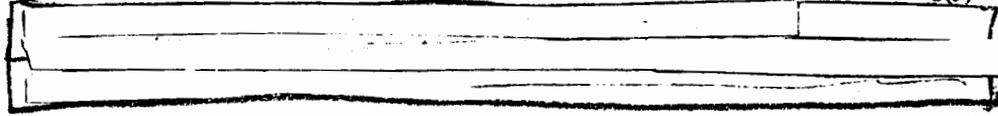
10. Service Line Treating

INTEREST

DOE  
b(3)

10. Service Line Treating

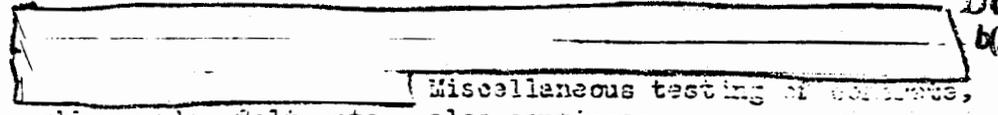
Laffy, Summers,  
Ranson, Siders,  
Muehlenkamp



Data is being secured on the martempering of 2024 Al-Cu steel. The  $M_s$  temperature level has been established between 475°-500°F., and further work will establish a relationship between size of piece being quenched and the time required to quench successfully to just above the  $M_s$  point.

11. Mechanical testing

Muehlenkamp



Miscellaneous testing of concrete, rubber pads, felt, etc., also continues.

12. Beryllium metallography

Chafey, Barkin, Wood,  
Welton, Nothaft

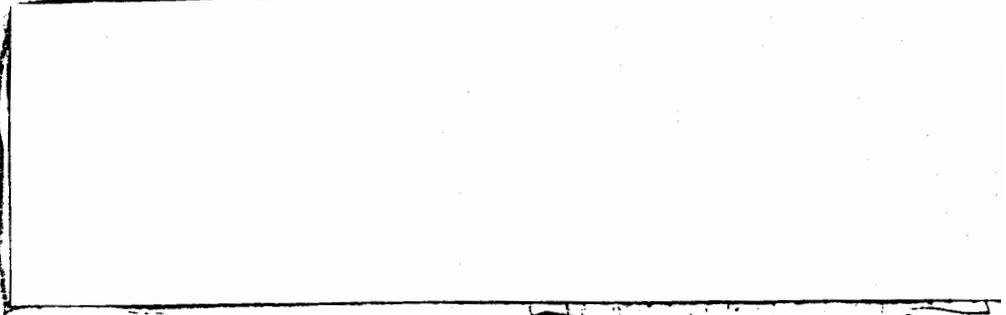
A method of metallographic preparation of beryllium has been worked out that appears to give excellent results. The procedure consists of grinding on diamond-charged laps, with diamond dust Nos. 2, 4, 7 and 3 successively, and finally polishing lightly on a cloth covered lap with alumina. A 2-5% aqueous sulphuric acid solution has been found to be a satisfactory etching reagent.

All shipments of extruded beryllium rod received from outside sources have been examined macroscopically for extrusion defects. This examination consists of cutting the bars -- usually 1 1/8" diameter -- into 2 1/2" lengths, grinding the transverse faces, and macroetching in 5% sulphuric acid. Following the findings of M.I.L., it has been found that beryllium is quite sensitive to shallow cracking when improperly cut, and that before macroetching, it is essential to remove the disturbed metal on the cut faces by machining.

Experimental work is being carried out on the machinability of beryllium, with particular attention to establishing a correlation between the microstructure and machinability. If the extrusion temperature of beryllium is sufficiently low, recrystallization can be effected by appropriate annealing, and this in turn will probably effect the machining characteristics of the metal.

13. Metallographic study of initiators

Chafey, Barkin, Wood,  
Welton, Nothaft



DOE  
b(3)

DOE  
b(3)

JOB AND PERSONNEL

PROGRESS

3.  $BF_3$  and counter preparation  
Wedges, Lloyd

Forty-eight neutron detection chambers have been filled with enriched  $BF_3$  for initiator testing equipment. Only three of the number showed any change of operating characteristics with time and had to be refilled.

Attempts have been made to find the most satisfactory method and gas mixture for filling fission chambers for initiator testing.

4. Foil preparation  
Miller, Potter

During the past month fifty-four uranium foils prepared by the sapon technique have been supplied to other groups, as well as fourteen 49 foils prepared by electrolysis. A number of boron foils have been made by the sapon technique using  $B_2O_3$ , and by sedimentation using amorphous boron.

In addition, research has been carried out on the following lines of investigation: (a) Search for a carrier suitable for collecting and purifying Pa. (b) Tracer studies on methods for electroplating "37". As a result of this work it appears probable that "37" can be electrodeposited from LiF solution using the method used for uranium.

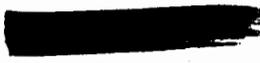
5. Water boiler  
Helmholz, Miller, Novenzel, Watkins

Further experiments have been made using the remote control ether extraction column at Omega with the following results:

- (a) The use of  $Ca(NO_3)_2$  in place of  $NH_4NO_3$  as salting out agent has made possible a rate of pumping of U solution five times that expected (but not realized) with  $NH_4NO_3$ .
- (b) At this pumping rate it has been found necessary to cool the extraction column to prevent boiling of the ether (See point (a) below).
- (c) Tracer experiments using a f.p. solution obtained by decontamination of small amounts of boiler soup have shown a  $\bar{J}$ -decontamination factor of 20 - 30.
- (d) Solution of  $Ca(NO_3)_2$  in "mock" soup has been tested under anticipated conditions and temperature control of reservoir tanks has been installed.

Considerable time has been spent in investigating the ether extraction process. The following points may be mentioned:

- (a) When 1 mol of  $UO_2(NO_3)_2$  is extracted from a solution 7M in  $UO_2(NO_3)_2$ , and 3.4M in  $Ca(NO_3)_2$  (composition of hot soup solution expected in column), approximately 10 kcal are evolved.
- (b) There is an overall volume decrease on extraction. For the case when equal volumes of ether and solution are used there is a 10% decrease in volume of the  $H_2O$  phase and only a 5% increase in the ether phase.



GROUP 2-14 MONTHLY REPORT -- Holmholz, Nevenzel, Watkins -- June 1, 1954 (cont.)

JOE AND NEVENZEL

PROGRESS

8. (cont.)

(e) A mechanism for the extraction has been proposed which, with the necessary activity coefficients of the salting out solution, will give the "practical" distribution coefficients to a factor of two or three.

9. Instrumentation

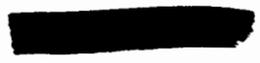
Sands, Sturgess

In addition to routine maintenance and counting, the assembly and testing of BF<sub>3</sub> counter have been carried on this month.

14. Radio-phosphorus

Holmholz, Nevenzel,  
Watkins

Work is in progress on the separation of radio-phosphorus from sulfur and the preparation of samples for counting for Group R-2.







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GROUP CM-3 MONTHLY REPORT -- G. S. Gardner, Group Leader -- June 1, 1945 (cont.)

JOB AND PERSONNEL

PROGRESS

7. (cont.)

Additional results of the process research partially reported in LMS-249, p. 12, are presented in tabular form below. All runs were on a 3-3 g scale with material from Lot 10-W. Correction of the neutron count for 410 spontaneous fission contribution cannot be made at this time, but the values given for the total emission have relative meaning. As can be seen from the table, the peroxide process looks inferior to the single oxalate process; the latter appears promising. However, no metallurgical fabrication tests were made on metal from any of these runs. It may be remarked that adoption of the single oxalate process or any other simple process as our only purification method is not advisable until it has been tested on full scale with adequate fabrication tests on the metal, and until definite specifications for purity of incoming material are agreed to by the Hanford Engineering Works, and until more definite specifications can be set as to the purity necessary for successful fabrication in the form desired.

(See table on next page)

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GROUP CM-3 MONTHLY REPORT -- J. S. Warner, Group Leader -- June 1, 1945 (cont.)

JOB AND PERSONNEL

PROGRESS

7. (cont.)

Schedule #	Purification	Dry Chem. Conversion to PuF <sub>4</sub>	Std. 3-g Reduction Yield***	Total m/g. sec., Remelted Metal****
7d	None	Evap. nitrate, ign. to PuO <sub>2</sub> , HF by A for 7 hrs., 98.3% PuF <sub>4</sub> ; 2 days for evap. & ign. Splattering.	96.30	9.8
7f	Single oxalate pptn.*	A, HF for 2.5 hrs., 98.7%	97.43	9.8
7f <sup>1</sup>	Duplicate*	Ditto, 97.6%	96.21	9.4
7g	"Silica" removed; single oxalate pptn.*	Ditto, 96.2%	97.67	9.0
7g <sup>1</sup>	Duplicate*	Ditto, 96.9%	96.62	9.1
7h	Single peroxide pptn.**	Evap., ign. to PuO <sub>2</sub> (12 hrs.), splattered; HF by A for 9 hrs., 76.2%. Requires 2 x as many boats due to peroxide bulkiness.	95.8	10.0
7h <sup>1</sup>	Duplicate**	Ditto, 91.6%	99.17	10.4
8h	"Silica" removed; single peroxide pptn.**	Ditto, except 7 hrs. for drying, 6 hrs. for HF, 91.5%.	96.65	9.9
8h <sup>1</sup>	Duplicate**	Ditto, 91.8%	94.86	10.0

\* By job 2 staff. \*\* By job 3 staff. \*\*\* By CM-3. \*\*\*\* By R-4.

GROUP 51-1 MONTHLY REPORT -- S. T. Weissman, Group Leader -- June 1, 1945

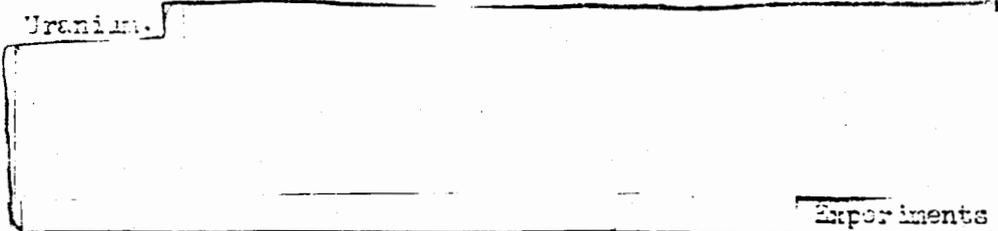
JOB AND PERSONNEL

PROGRESS

DOE  
b(3)

6. Protective coatings for Uranium, Uranium and plutonium

Bartlett, Putman,  
Ferman, Jones, Yuster



Experiments to increase the protection are showing promise on more recent pieces.

Lipkin, Perlman,  
Spindel, Weissman

Plutonium. Two one-centimeter discs of plutonium metal were cleaned by a dip in concentrated nitric acid following anodic treatment in trisodium phosphate solution. These discs were then coated with  $10^{-5}$  inches of rhodium by evaporation. Corrosion tests on these pieces did not give the same favorable result which was reported last month on a piece similarly treated. Work on this problem has been suspended.

7. Initiator program

Williams

Evaporated coatings. Evaporation does not seem to be a suitable method of depositing alpha stopping layers of metal upon beryllium initiator pieces. If the beryllium surface is etched by heating it in vacuum until some of the metal distills, copper evaporated coats are adherent. These coats however even of two or three range thickness have holes sufficient to give a neutron background of 0.04% to a half urchin in the most favorable case. Work is being concentrated on other methods.

Lipkin, Perlman,  
Spindel, Weissman



This method shows promise and work is continuing on it.

GROUP CM-7 MONTHLY REPORT -- A. E. Seybolt, Group Leader -- June 1, 1945

JOB AND PERSONNEL

PROGRESS

3. Refractories

Mullen, Miller,  
Lohman, Sargent,  
Walsh, Snoddy

The U and V crucibles for the 25 melting program have been completed. A few V lids are still to be made, together with stopper rods when the size of the latter is decided upon. Most of the 5 1/4" MgO mold plates are finished, and about half of the 7 3/4" plates have been made. The procedure has been standardized on all these products, and the manufacture is now routine.

The X-1 crucibles and Y-1 stools for Hammel are being made on a 6 per week basis, and these products are apparently entirely satisfactory. Owing to changes in the 49 remelting program, no more Y-1 crucibles are required, and sufficient Y-3 crucibles have already been made. The Y-2 crucible will be pressed from G.E. low boron MgO.

One of our men stationed at Vitrefrax is preparing some coarser grades of MgO to be mixed with the fines already on hand in order to secure a denser body.

12. Lead-boron bricks

Kamm, Barnard

Fourteen lead-boron bricks 1/2" x 3" x 6" containing 1.5 g. boron per cc were turned over to Woodward in building X for neutron absorption purposes. The boron was 82% B10. There was enough boron for an atomic ratio of 9 boron to 1 lead.

13.

Wellborn, Harrington,  
Crumbly, Wine

None have been made in the last few days because of an over-supply as compared to projectiles. Plenty of 5-hole anvils are on hand also. About 19 more are required to complete present orders. In the case of projectiles, about 30 more are required. As many of these as possible will be made of chips.

Some shock test specimens for Serduke were not pressed also.

19. General foundry work

Arnold, Aronow,  
McDonnell, Wessel,  
Smith, Williamson,  
Crumbly

Besides the usual tuballoy work, several cadmium castings for the Ra-La work were made.

20. General powder metallurgy

Hirsch, Kowalchik

Practically all of the effort in this field during the month has been put on the development of a suitable technique for making powder compacts of AuBe<sub>2</sub>.

The component fine powders are intimately mixed, and pressed at 50 tons

DO  
b3







GROUP CM-8 MONTHLY REPORT -- E. R. Jetts, Group Leader -- June 1, 1945 (cont.)

JOB AND PERSONNEL

PROGRESS

23. (cont.)

stable delta field ( ~ 400°C) with disastrous effects on the dies. The metal was found to be extremely soft, the resulting flash combined with the great difference in thermal expansion coefficients of the steel and Pu wedged the die plungers. A 20 g piece was formed in a 3/4" dia. die at room temperature. Though the unconstrained metal flowed readily to a reduction of height of over 50% at 20,000 psi, a load of 100,000 psi was required to fill out the corners sharply. To determine the optimum conditions of temperature and load for present equipment a series of 50 g samples were pressed. Results indicated that at a temperature between 200°C and 300°C a load of 30,000 psi would be sufficient.

DO  
b3

24. Corrosion protection

Kirby, Covert,  
English, Ranftl

Experiments were started to determine the durability of such coatings under anticipated handling conditions.

GROUP CM-9 MONTHLY REPORT -- H. A. Petrats, Group Leader -- June 1, 1945

JOB AND PERSONNEL

PROGRESS

1. Cupferron separation of heavier elements from plutonium  
No further work. Final report on cupferron procedure almost completed.

Simi, Wildi

2. Direct sparking of plutonium  
Completion of the double-compartment spark chamber and hood is promised by June 2. Following installation the direct spark analysis of product solutions will be resumed.

Conway, Nachtrieb

26. Summary of analytical services  
Samples completed and reported during May, 1945

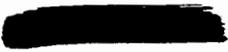
<u>Group</u>	<u>No.</u>
CM 4	2
CM 5	2
CM 6	22
CM 7	8
CM 8	15
CM 9	11
CM 11	24
CM 13	90
CM 14	2
CM 16	47
Ordnance	19
Physics	34
Miscellaneous	5
<b>Total</b>	<b>281</b>

31. Instrumentation  
Eastman Kodak has supplied film coated with 103-af emulsion, in accordance with our request for a film which has low granularity, moderately high contrast, moderate speed, and is sensitized over the range 5500 - 7000 Å. The film has been tested in the 2 slit spectrograph method of extending range, and found to be quite satisfactory for pyroelectric analyses.

Conway, Nachtrieb

32. Application of the pyroelectric method to plutonium oxide  
An arc stand has been completed and installed in the "dry box" for use in pyroelectric plutonium analyses. The controls for the arc holder are manipulated outside of the box by means of flexible shafts. Greater safety, convenience, and reproducibility have resulted from use of the new stand, and the pyroelectric analysis of plutonium is again on a routine basis.

Wexler, Nachtrieb,  
Conway, McCall



WASH 24-9 MONTHLY REPORT -- H. A. ... Group ... -- June 1, 1945 (cont.)

THE LEAD PERSONNEL

PROGRESS

55. Wave-length determinations of plutonium lines.

Work to be resumed when double-compartment spark chamber and hood are installed.

56. The analytical separation of zirconium, thorium and other impurities from plutonium by hexone extraction

Studies on the distribution of bismuth and gallium between hexone and an aqueous medium 2-3M in  $HNO_3$  and 0M in  $HNO_3$  have been completed. For both elements, present at about 0.5 to 5 g/l., less than 1% is extracted into the hexone.

Rudoff, J. Miller, Wildi

Recoveries of Bi, Th, and Zr from the  $HNO_3$ -destruction phase of the method average 85%, according to the best technique used to date (fuming with equal parts of  $HNO_3$  and HCl under an infra-red lamp). The solution is evaporated just to dryness and then taken up in HCl. Failure to recover these elements from a hexone extraction of spiked plutonium was traced to the presence of large concentrations of magnesium in the plutonium which prevented normal excitation of the Th, Zr, and Bi. Recoveries of Th, Zr, and Bi are found to be low if the electrodes are not sparked on the same day the solutions are evaporated thereon. This is due to the tendency of the film to weaken mechanically and deteriorate with age. In this condition the impurities are dislodged from the spark without being appreciably excited.

57. Tannic acid method for Zr and Ti in uranium and plutonium

The best recoveries of Zr and Ti are 53% and 34% to date, using Sn as an internal standard and a graphite spark for excitation. Tin tannate is not a very good carrier for Zr and Ti in 0.2N HCl. Use of Zr as a carrier for Ti and Ti as a carrier for Zr has been tried with no substantial differences in recovery. Recovery will now be studied as a function of acidity.

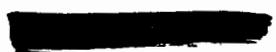
Sini, Nachtrieb

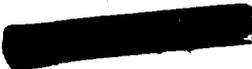
58. Studies in extraction

A distribution ratio of over 1000 for  $Fe^{+3}$  between di-isopropyl ether and HCl has been found for 7.5N HCl. The empirical formula of the extracted complex is  $HFeCl_4$  for acid concentrations below 8N. There is evidence for the existence of  $H_2FeCl_5$  in the ether phase for extractions from 10 - 12N HCl.

Conway, Bachelder, Nachtrieb

Optimum conditions for the di-isopropyl ether extraction of gallium from HCl are being sought. Data are not yet complete, but the evidence is that very favorable distribution ratios exist for HCl concentrations somewhat above 5N.





MEMORANDUM MONTHLY REPORT -- H. J. ... , Group Leader -- June 1, 1945 (cont.)

PERSONNEL

PROGRESS

39. Determination of sulfate  
in 40 solutions

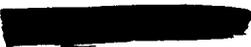
This procedure has been written up for the "Operators  
Manual" and is now used routinely in the analysis of  
Hanford solutions.

Depkowitz

40. Attempt to develop a  
method for uranium in  
urine

Problem discontinued.

Bachelder







~~CONFIDENTIAL~~

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DPF OM-12 MONTHLY REPORT -- W. A. Welch, Group Leader -- June 1, 1948 (cont.)

PERSONNEL

PROGRESS

1. E. (cont.)

methods which might be effective in case of boiling solutions are being continued.

1. J. Monitoring and decontamination in DP East Area

Start of operations in this building is scheduled for June 15th. It is hoped that by that time sufficient personnel will have arrived to be assigned to this section.

3. Instrument section

The following list of instruments were used during the month:

- 8 alpha hand counters
- 25 Plutos
- 2 GM survey meters
- 1 Snoop
- 1 Poppy

The following instruments arrived from Chicago during the month:

- 3 GM survey meters
- 2 L & W survey meters (beta and gamma)
- 2 Poppy units (alpha survey meters)
- 1 Alpha hand counter (air filled)
- 3 Air monitoring units (on loan from Medical Group)

The above instruments are being calibrated and being put into use as rapidly as possible, considering available personnel. One member of this section was sent to Chicago to discuss our health problems and to become familiar with the instruments, which are to be supplied to us.

4. Laundry

The total amount of protective clothing washed in the laundry is as follows:

Miles Wells

- 1. 23098 pieces of protective garments
- 2. 11627 rubber gloves
- 3. 564 respirators

The number of persons required for the laundry at DP Site has been determined, and steps have been taken to obtain the additional employees. Two additional girls are already at work at the present laundry.

An experiment whereby gloves are being washed periodically with Sulpho-Soap while being used by the laboratory technicians is under way and shows promise of substantially lowering the contamination of the gloves and lengthening the amount of time they may be used before sending them to the laundry.

~~CONFIDENTIAL~~



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UNDER QM-12 MONTHLY REPORT -- W. H. Hinch, Group Leader -- June 1, 1945 (cont.)

3. AND PERSONNEL

4. (cont.)

5. Miscellaneous

PROGRESS

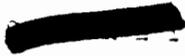
Duplicate copies of all records indicating general building conditions and all records and reports pertaining to personnel exposed, are sent to the Medical Group.

A CM Health Handbook is to be written jointly by the .I. and Medical Group. It is hoped that this Handbook will be available before DP operations begin.

[REDACTED]  
~~CONFIDENTIAL~~







BA-14 MONTHLY REPORT -- [redacted] -- June 1, 1948

PERSONNEL

ACCIDENTS

8. Apparatus Modifications

Bluestein, Dodson,  
Friedlander, Knobloch,  
McCann, Spence, Weimann

The pressure-vacuum system has been simplified and a new control board with more reliable flow meters and pressure indicators has been installed. The filter apparatus has been modified considerably. The elimination of the filter tube previously used for air-stirring has appreciably reduced the hold-up of active material on the filter apparatus and eliminated the possibility of active material backing up into the vacuum-pressure system outside the lead shield. All valves have been redesigned to operate more positively and with less exposure to personnel. A new system for holding spongy platinum pads in place has been put into operation.

9. Radiochemical studies

Bonner, Sands

The growth-decay behavior of recent Ba-La shipments has given rise to the suspicion that  $\gamma$ -emitting impurities are present. A radiochemical analysis of each incoming shipment is therefore planned, and work on this project has been started.

Earth samples are now being taken after each BaLa shot and their decay is followed on a GM counter to determine the amount of Ba<sup>140</sup> impurity present in each BaLa sample delivered.





U.S. BUREAU OF CHEMISTRY, DEPARTMENT OF COMMERCE, BUREAU OF STANDARDS, June 1, 1948

PROGRESS

PROGRESS

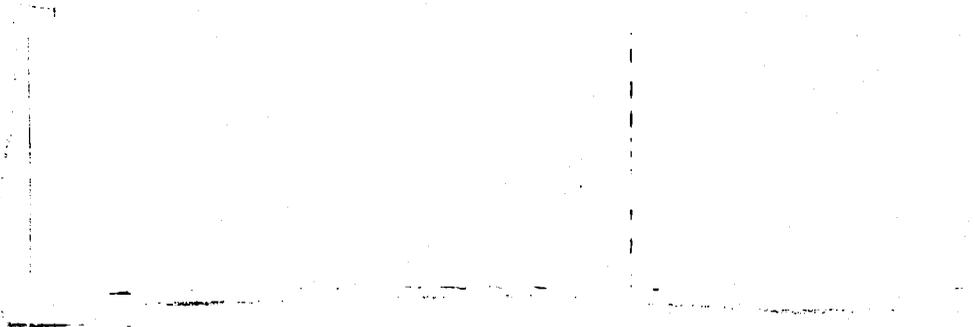
10-2580

An investigation has been made of the distribution of polonium metal either plated or distilled on the various shaped objects connected with the production of an alpha-tiator. For this purpose, appropriately designed pin-hole cameras were constructed which consisted essentially of a holder for the polonium plated object, a 0.2 mm pin-hole in 1 mil gold foil, and a photographic plate on the opposite side of the pin-hole at distances which resulted in 2 to 4 times linear magnification. The alpha particles thus recorded themselves in the emulsion and effected an enlarged image of the original plated surface.

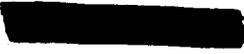


Electroplated deposits were found to be uniform provided that the cathode was maintained to a constant potential (within 1%) relative to the solution, whereas without such control the deposits were spotty, and in some cases non-adherent.

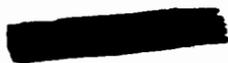
A high density spot of polonium distilled onto platinum was found to have increased its diameter by about 5% (0.1 mm) after standing two weeks at room temperature in the open air.



A codeposited copper and polonium electroplated deposit was completely unsatisfactory due both to non-adherence of the deposit and to polonium loss during heating.







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RESULTS

REQUIREMENTS

protection cannot be attained with 100% certainty. In fact a considerable fraction of the surfaces tested have exceeded tolerance.

It is noteworthy that a number of Po deposits on protected equilibrium surfaces have been sealed in helium and the neutron background has not increased grossly over a period of a few days.

Eacking coats of silver and of copper have been put on a large number of test pieces to prepare them for sectioning by group GM-2. DOI b(3)

- 9. Gamma ray measurements
- Martin, Hall, Roberts

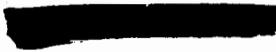
A Geiger-Müller counter has been set up for measuring the gamma activity of Po deposits. The experiments have confirmed the suggestion of DeBenodetti, LANS-205, that the gamma rays of Po (0.35 Mev. intensity  $6.6 \times 10^{-6}$  c of radium per c of Po in equilibrium) can be used for estimating the quantity of Po in amounts greater than one curie with an accuracy of 5 to 10%.

- 10. Instruments for DP Site East Area
- Cuykendall (G-2),
- Martin

The procurement of satisfactory instruments for DP Site is being handled by Cuykendall and his section. Five Simpson proportional counters have been received from the Metallurgical Laboratory but have not been operated successfully as yet. Low geometry attachments are being constructed to measure in the range from 100 microcuries to 25 curies. Two BF<sub>3</sub> proportional counter units, using B<sub>10</sub>, are being prepared by group GM-4.

- 11. Special preparations
- Durrill, Gillespie,
- Sullivan, Frestwood,
- Robinson, Wolf

Preparation of special test pieces for Group G-10 has been carried along on a limited scale.



MONTHLY REPORT OF THE DIRECTOR, BUREAU OF CHEMISTRY, U.S. DEPARTMENT OF COMMERCE, FOR THE MONTH OF JUNE, 1941

PLANNING

PROGRESS

1. Recovery of 25 metal  
from residues  
Coyne, Connolly,  
Calkins, Wilkinson

Little operation during the month. The equipment for the  
solving reaction crucible was moved to H Building. The  
refrigerating system for cooling the ether condensate on  
the extraction column was received and partially installed.

2. Recovery from fabrica-  
tion residues  
Carnon, Menker,  
Calkins, Wickers

About 1300 g. of purified 25 as  $T_2O_3$  was recovered from  
residues from remelting and machining operations. There  
were no important changes in methods.

3. Recovery from miscel-  
laneous residues  
Menker, Walsh,  
Wickers

Progress was made in working up accumulated solutions  
resulting from the cleaning of fabricated metal.

4. Reprocessing of 25  
metal  
Entire group staff

Plans were made and equipment assembled for the re-purifica-  
tion of the 25 metal now in the form of "cubes". This  
operation will probably begin in June.

5. Conversion of purified  
oxide to fluoride  
Walsh, Lasovick,  
Goldsmith, Waddell

The metal recovered and purified under job 2 was converted  
to  $UF_4$ .

6. Preparation of gold and  
platinum for initiators  
Browning

[Redacted]

7. Preparation of special  
reagents  
Browning

No work other than maintaining the usual supply of quartz-  
distilled water, hydrochloric acid and nitric acid.

DOE  
b(3)

