

11 January 1946

700240

To: Dr. J. J. Nickson
From: E. R. Russell
In Re: Abstract of Work for the Month Ending
January 11, 1946

for Plutonium activity

I. Routine Urine Survey - 249-MLH-3501

A. Urine Specimens Received

Chicago	80
Other	0

CLASSIFICATION CANCELLED

DATE JAN 11 1967

For the Atomic Energy Commission

B. Backlog of Specimens

Chicago	51
Other	28

RAYMOND A. CARPENTER

for the

Chief, Declassification Branch

C. Specimens Analysed

Chicago	69
Other	38

Of the Chicago specimens analysed, 7.3% showed a body content of plutonium greater than 0.1 ug, 32% showed negative counts (maximum being less than 0.1 count per minute) and the remainder showed less than 0.1 ug retained in the body.

The laboratory which was designed to be dust-free in order to avoid outside contamination has not met the specifications. However, control urines have been run quite frequently and none have shown counts in excess of 0.1 count per minute per 1000 ml sample.

Special Urines: Two humans were injected with 94.91 ug of plutonium on December 27, 1945. The composition of the injected solution and the volume injected is given in Table I. The urinary plutonium excretion for the male subject is given in Table II and for the female in Table III.

REPOSITORY *IME - Chicago Ops - Center*
FOR Human Radiobiology

COLLECTION *CHR/Plutonium DICS*

BOX No. *2 of 2*

FOLDER *40-005 Chi-2*

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Espionage Laws, Title 18, U.S.C. Sec. 793 and 794,
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Table I
Composition of Solution

Plutonium Concentration. . .21.67 ug/ml
Volume injected (each) . . .4.4 ml
pH6.5
Sodium citrate0.01 M
Isotonic Saline

Table II

Daily Plutonium Urinary Excretion (Male)
MX-200

Chicago Case #3 RER
12/19/72

Days after Injection	24-hour volume	Specific Gravity	% of injected dose excreted
1	1130 ml	1.014	0.857
2	1425	1.013	0.182
3	940	1.012	0.063
4	1400	1.012	0.077
5	1160	1.012	0.026
6	1270	1.014	0.0256
7	1290	1.012	0.0234
8	9940	1.012	0.0227
9	550	1.012	0.0082
10	535	1.012	0.0097
11	650	1.010	0.0097
12	640	1.010	
13	640	1.010	

The following table shows the results of the analysis of the urine samples collected during the 13-day period. The data show that a total of 0.0147 mg of plutonium was excreted in the urine, which is equivalent to 0.068% of the injected dose. The excretion of plutonium in the urine is very low, and it is expected that the majority of the injected plutonium will be excreted in the feces. The pH of the urine is 6.5, and the presence of sodium citrate in the solution may have caused the precipitation of uric acid, which is known to be excreted in the urine.

The following table shows the results of the analysis of the urine samples collected during the 13-day period. The data show that a total of 0.0147 mg of plutonium was excreted in the urine, which is equivalent to 0.068% of the injected dose. The excretion of plutonium in the urine is very low, and it is expected that the majority of the injected plutonium will be excreted in the feces. The pH of the urine is 6.5, and the presence of sodium citrate in the solution may have caused the precipitation of uric acid, which is known to be excreted in the urine.

(11)

Table III

RET 12/19/72

Daily Plutonium Urinary Excretion
(Female-WX-300)

Chicago Case # 2

Days after Injection	24-hour volume	Specific gravity	% of Injected dose excreted
1	1660 ml	1.012	0.152
2	1725	1.010	0.167
3	1750	1.012	0.067
4	1150	1.012	0.033
5	2020	1.010	0.042
6	1300	1.010	0.042
7	1190	1.010	0.0243
8	1500	1.010	0.0254
9	1400	1.010	0.019
10	1280	1.010	0.030
11	1120	1.010	0.019
12	940	1.010	0.014
13	875	1.010	
14	630	1.010	
15	830	1.010	

Plutonium Therapy: Studies are being completed on the effect of pH and citric acid concentration on the diffusibility of Pu(IV) through cellophane membranes using low pressure ultra-filtration techniques. A report summarizing the results obtained in preliminary studies of Pu therapy is being prepared.

Results of ultrafiltration to date show that a pH of about 2.5 immediately precedes a steep drop in the extent of Pu(IV) which is diffusible, thus indicating, it is presumed, the onset of definite colloidalilty. At a pH of 7.3 and in the presence of varying amounts of citric acid, it is found that:

(a) As little as 0.0001 M citric acid appreciably increases the diffusibility of Pu.

(b) A minimum in the diffusability of Pu occurs at .005-.006M citric acid. This phenomenon, if confirmable, may be related to the neutralization of a positively charged Pu colloid by the negatively charged citrate ion. Migration experiments are planned to study the sign on the Pu colloid and complex directly.