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HANFORD ATOMIC PRODUCTS OPERATION

GENERAL ELECTRIC

RICHLAND, WASHINGTON

HW-31864

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May 17, 1954

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COPY 1 of 1

W.G. Browne
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URANIUM BLENDING

- You have expressed a desire to have data made available which can be used to schedule dissolver charges for the low g/T program. We understand that the need for such data has become apparent since we have started processing this material though the 100 areas endeavor to ship uranium to the 200 areas which is expected to meet specifications. We are presenting herein tables and curves calculated from the best known relationships between MWD/T, g/T and % Pu²⁴⁰. The basic equations used are:

$$(1) \text{ g/T} = 0.9945 \text{ MWD/T} - 0.0002333 (\text{MWD/T})^2$$

$$(2) \% \text{ Pu}^{240} = 0.0075 \text{ MWD/T}$$

In Table I calculated values for g/T and g Pu²⁴⁰/T are listed for various MWD/T exposure levels. These data were used to calculate the blending required to yield plutonium whose Pu²⁴⁰ content is equivalent to that of 225 MWD/T plutonium (1.688 % Pu²⁴⁰). These data are presented in Tables II and III and are graphically represented in Figures I and II. Figure I is a graphical presentation of the data given in Table II and can be used to determine the tons of high MWD/T (230 - 260) uranium which can be blended with one ton of low MWD/T (150 - 220) uranium to yield plutonium whose Pu²⁴⁰ content is equivalent to that of plutonium from 225 MWD/T uranium. Figure II is a graphical presentation of the data given in Table III and can be used to determine the tons of low MWD/T (150 - 220) uranium that must be blended with one ton of high MWD/T (230 - 260) uranium to yield plutonium whose Pu²⁴⁰ content is equivalent to that of plutonium from 225 MWD/T uranium.

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- • • It must be recognized that these data are the best available at this time. Work is now in progress which will when completed allow the accumulation of similar data which more nearly applies to the conditions which now prevail.

AE Smith:pec

Z-Plant Process Technology
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FIGURE I

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FIGURE II

Example
One ton of 250 MWD/T uranium blended with 1.95 tons of 200 MWD/T uranium will yield plutonium with a Pu^{240} content equivalent to that of 225 MWD/T plutonium.

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TABLE I

<u>MWD/T</u>	<u>g/T</u>	<u>% Pu²⁴⁰</u>	<u>g Pu²⁴⁰/T</u>
150	143.9	1.125	1.619
160	153.2	1.200	1.838
170	162.3	1.275	2.069
180	171.5	1.350	2.315
190	180.5	1.425	2.572
200	189.6	1.500	2.844
210	198.6	1.575	3.128
220	207.5	1.650	3.424
225	212.0	1.688	3.578
230	216.4	1.725	3.733
235	220.8	1.762	3.890
240	225.3	1.800	4.059
250	234.1	1.875	4.389
260	242.8	1.950	4.735

TABLE II

Uranium MWD/T	Tons Uranium Ton 150 MWD/T	Tons Uranium Ton 160 MWD/T	Tons Uranium Ton 180 MWD/T	Tons Uranium Ton 200 MWD/T	Tons Uranium Ton 210 MWD/T	Tons Uranium Ton 220 MWD/T
260	1.27	1.17	0.910	0.558	0.35	0.124
250	1.85	1.71	1.358	0.814	0.51	0.18
240	3.20	2.96	2.301	1.412	0.88	0.31
235	4.96	4.58	3.555	2.18	1.37	0.48
230	10.00	9.35	7.250	4.45	2.80	0.98

TABLE III

Uranium MWD/T	Tons Uranium Ton 260 MWD/T	Tons Uranium Ton 250 MWD/T	Tons Uranium Ton 240 MWD/T	Tons Uranium Ton 235 MWD/T	Tons Uranium Ton 230 MWD/T
150	0.787	0.540	0.312	0.202	0.100
160	0.854	0.585	0.337	0.218	0.107
180	1.09	0.736	0.434	0.282	0.138
200	1.79	1.23	0.708	0.458	0.224
210	2.85	1.98	1.136	0.729	0.357
220	8.06	5.55	3.225	2.08	1.020

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