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HANFORD TECHNICAL RECORD
GENERAL ELECTRIC

HANFORD ATOMIC PRODUCTS OPERATION - RICHLAND, WASHINGTON

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March 17, 1958

TITLE

MACROSCOPIC FISSION CROSS SECTION RATIO OF
PU239 TO U235 AS A FUNCTION OF EXPOSURE
FOR TWO LATTICES AND TWO SLUG TYPES

AUTHOR

ISSUED OCT 24 1967

ISSUING FILE

L. K. Stanton

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SUMMARY (Continued)

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The final equation for the ratio then is:

$$R = 3.026 \times 10^{-3} \frac{\left(\frac{\text{gm Pu}}{\text{Ton}}\right) (1 - \%240)}{14.23 \frac{\text{lb U-235}}{\text{Ton}} \text{ consumed}}$$

Graphite temperatures for this calculation were 450° C, and the corresponding 700° K curve was used to find %240 from Heineman.³

Sample Solution:

Solid, 8 3/8" lattice, 100 $\frac{\text{MWD}}{\text{T}}$

gm Pu/Ton = 95.34

lb U²³⁵/Ton = 0.25

%240 = 1.04

$$R = 3.026 \times 10^{-3} \frac{\left(\frac{\text{gm Pu}}{\text{Ton}}\right) (1 - \%240)}{(14.23 - \frac{\text{lb U}^{235}}{\text{Ton}})}$$

$$= (3.026 \times 10^{-3})(95.34)(0.9896)(14.23 - 0.25)^{-1}$$

$$= \frac{(3.026)(9.534)(0.9896)(10)^{-2}}{(13.98)} = 2.042 \times 10^{-2}$$

TABLE OF RATIO VS. EXPOSURE (x 10⁻²)

<u>EXP./CASE</u>	<u>I</u>	<u>II</u>	<u>III</u>	<u>IV</u>
0	0	0	0	0
100	2.04	2.11	2.17	2.25
200	4.03	4.15	4.27	4.43
400	7.81	8.06	8.29	8.60
600	11.37	11.72	12.05	12.51
800	14.66	15.11	15.54	16.14
1000	17.67	18.22	18.75	19.48

Exposure units are megawatt days per ton.

Case I = solid, 8 3/8" lattice, R x 10²

Case II = I & E, 8 3/8" lattice, R x 10²

Case III = solid, 7 1/2" lattice, R x 10²

Case IV = I & E, 7 1/2" Lattice, R x 10²

Operational Physics Operation
Research and Engineering
IRRADIATION PROCESSING DEPARTMENT

LK Stenton:ckh

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