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Distributions

1. O. V. Swisart - S. O. Smolen
2. F. R. McMurray
3. J. C. Chatten - W. A. DeHollander
4. V. R. Cooper
5. R. O. Gumprecht
6. Extra
7. 300 File
8. Yellow File

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EQUATIONS FOR PREDICTING TRITIUM CONTENT OF IRRADIATED
LITHIUM-ALUMINUM SLUGS

The original work with the material in HW-22209 was done by David Heiser in September of 1951. At that time, it was not known whether the data were valid or not. Subsequent events have indicated that the conclusions were essentially correct. The original material has been edited and revised by W. A. DeHollander for publication at this time.

R. Christianson collected yield data through August, 1951, and submitted this data for statistical evaluation. The report of the statistics group, HW-22209, yielded the following information.

$$1. YI = -.1787 \frac{XI}{\text{slug}} + 18.5238 \quad (1)$$

• .8442 = standard error in Y.I.

2. There is less than one chance in a hundred that YI is constant or independent of exposure.

From (1), Heiser derived an equation for yield as

$$Yield \text{ cc/slug} = -.8443 (UCX)^2 + 40.267 (UCX) \quad (2)$$

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From (2) in turn, DeMollander calculated

$$\text{Yield gram/slug} = -0.0002274 (\text{UCE})^2 + 0.0104 (\text{UCE}) \quad (3)$$

The terms are defined as follows:

$$\text{YI} = \text{yield index} = \frac{\text{total yield, as } T_2 \text{ per run}}{\text{total EI per run}}$$

$$\text{EI} = \text{Exposure index} = \frac{\text{Total tube MPD} \times \text{Slug length in inches}}{\text{Number of J-E pairs} \times 4}$$

$$\text{UCE} = \text{Unit Cell Exposure} = \text{EI} \times \text{Power distribution factor}$$

The UCE is essentially the heat generated in a J-E or J-N pair. Equations (2) and (3) have been used for calculating yields on the DM-10 load and are about 5 per cent low. It is important to note that equations (2) and (3) are independent of pile loading pattern except that J-E or J-N pairs or their equivalent are considered in calculating unit cell exposure.

W.R. DeM.

F-10 Process Studies
ENGINEERING DEPT.

W. R. DeMollander:efg

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