THE DOW CHEMICAL COMPANY
ROCKY FLATS DIVISION
GOLDEN, COLORADO

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TWO EXPERIMENTAL SUB CRITICAL ARRAYS
OF Pu(NO₃)₄ SOLUTION

by
C. L. Schuske

J. G. Epp - Technical Services Manager

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I. Shielded Array of 5 in. Diameter Tanks


2. Shielding: 4 in. thick Benelex is on the top and sides of the array with a concrete floor at the base. The side shields are ~ 6 in. from the tanks, the top shield ~ 12 in. from the tanks, and the concrete floor ~ 2 in. below the tanks. There is no intervening shielding between tanks. (Benelex has a density of 1.44 g/cc.)

3. Fuel: Pu(NO₃)₄ solution at 5N excess HNO₃, 400 g Pu/liter.

4. Conclusion: An extrapolation of the inverse multiplication curve (Figure I) indicates that these 5 tanks could have been of infinite length and remained subcritical.
II. 30 in. Diameter Raschig Ring Filled Tank

1. Test Vessel: 30 in. diameter stainless steel tank. The Pyrex Raschig rings occupy ~ 25 v/o of the tank and contain ~ 6 w/o natural boron. The Pyrex rings have the following nominal specifications:
   - O.D. - 1-1/2"
   - wall - 5/32"
   - height - 1-3/4"
   - 19% $\text{B}_2\text{O}_3$

2. Reflector: An "L shaped" concrete wall, 8 in. thick, bounds the tank on two sides (Figure IV) the concrete floor below the tank can be assumed infinite. The test vessel is in a room containing other tanks of solution.

3. Fuel: $\text{Pu(NO}_3\text{)}_4$ solution at 9N excess $\text{HNO}_3$, 350 g Pu/liter.

4. Conclusion: Extrapolation of the inverse multiplication curve (Figure III) indicates the test vessel would not be critical at any height.
Shielded In - Line Array
of Five Tanks

5' schedule 40, s.s. tanks
4' Benelex shielding
(sides= 6' from tanks,
top= 12' from tanks)

Test Solution:
400 g Pu/l
5-1 0' N HNO₃

Fig. 1
TANKS: 5" dia., Sched. 40, S.S.
BENELEX: 1.44 g/cc DENSITY
30" DIAM. RASCHIG RING FILLED TANK

FUEL:
Pu(NO_3)_4, 9N HNO_3 Excess
350 g Pu/liter

POISON:
6% Nat. B.
25% of Tank

Fig 3
EXPERIMENTAL RACK
RASCHIG RINGS FILLED

FIG. 1

CONCRETE WALL