

**MALLINCKRODT
NUCLEAR
CORPORATION**

SAINT LOUIS 7, MISSOURI • U.S.A. • CENTRAL 1-8980

May 25, 1959

Mr. Lyall Johnson, Chief
Licensing Branch
Division of Licensing & Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

Dear Mr. Johnson:

Subject: Direct Conversion of UF_6 to UF_4

*Direct in nuclear
envelope in the factory*

This letter will supplement our license application for the process to convert UF_6 (uranium hexafluoride) into UF_4 (uranium tetrafluoride). As a result of our discussions with you, Mr. J. C. Delaney, and Mr. C. D. Luke, we need to supply four additional items. The two additional prints requested are enclosed. The two calculations on the interactions of the three major uranium containing vessels in the process and the interaction between the one-gallon polyethylene bottles used in storage have been made.

Interaction calculations were made for an array of 5" diameter cylinders located in positions corresponding to the UF_6 cylinder, reactor, and filter as shown on drawing 3407-A. All three cylinders were assumed identical and equal to the reactor dimensions. The reactor is the largest cylinder in the system. Solid angle calculations (steradians) were made following the formulas shown on page 14, section B in the "Nuclear Safety Guide" Bulletin TID-7016. The sum of the two solid angles calculated from the reactor cylinder is equal to 0.543 steradians. This is in accordance with Paragraph 5 listed under Safe Interactions, Page 24 in "K-1019". The sum of all other solid angle calculations, using the filter or UF_6 cylinder as the point of interaction, gives numbers smaller than the above mentioned sum. Assuming a K factor of 0.58 for 5" diameter cylinders, the maximum number of steradians allowable is 3.2 as shown on Page 37, Figure 6 in "K-1019". This system is therefore assumed to be quite safe.

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The solid angle calculation between two 6" diameter, one-gallon polyethylene bottles with an edge to edge space of 18" is 0.153 steradians. Using a K factor of 0.8, the allowable angle is 1.0 steradian.

Strict administrative control is used to insure that storage containers of the finished UF_6 are kept in the rack and not accumulated in other geometrical arrays.

The Mallinckrodt Nuclear Corporation is herewith withdrawing the request for "company confidential" handling of the materials submitted in support of our license request dated May 11, 1959.

Please do not hesitate to wire or call if additional questions arise.

Sincerely yours,

MALLINCKRODT NUCLEAR CORPORATION

G. W. Tompkin, Manager
Research & Development

GWT:ckp

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