

5-24-60

UNITED STATES GOVERNMENT

## Memorandum

TO : Lyall Johnson, Chief  
Licensing Branch

FROM : Edson G. Case, Acting Chief  
Hazards Evaluation Branch

SUBJECT: MALLINCKRODT NUCLEAR CORP.

DATE:

We have reviewed the Mallinckrodt application dated April 16, 1960, requesting approval of a proposed new storage facility and procedures for storing uranium materials enriched to 10% S<sup>235</sup> in U-235.

The proposed storage facility is fireproof and substantially constructed, 100' long by 32' wide. Steel shelving will be located inside and adjoining sections of the two long walls. Sections of concrete wall 8" thick will be located down the center of the building the long way, and steel shelves will be fixed to both sides of this wall. Thus, there will be four rows of shelves, the inner two rows separated by 8" of concrete, an effective shield. The two outer rows will be separated from the inner rows by at least 12'. The shelves are constructed to provide cubicles 29" wide by 32" high, in which will be stored either 5-gallon or 15-gallon drums of uranium materials of 5% enrichment and below. The drums will be stacked four-high.

For 15-gallon containers (16.5" dia x 19.5" h) the shelves will provide 12" edge-to-edge and top-to-bottom spacing between drums. The drums will have a center-to-center spacing of 29" horizontally and 32" vertically. As noted above, the spacing (edge-to-edge) between containers in the parallel arrays on each side of the center shield wall is 12'. The amount of material in each drum will be limited to the permissible values in Table II, TID-7019, which include allowances for double-batching and optimum moderation, even though the material in the containers will be dry and the steel drums are closed with gasketed lids.

We agree with the applicant that the mass limits and spacing meet accepted standards, but request that you notify the applicant that his conclusion as to spacing was based on an erroneous assumption. Mallinckrodt used TID-7016 as the basis of the statement that two parallel arrays separated by 12' are isolated. This is true for parallel linear arrays, but the Mallinckrodt shelves, with four tiers of drums in the vertical dimension, must be considered as associated planar arrays, when separated by at least 7.5'. Thus, from Table 6, TID-7016, it is determined that

*Another word  
the applicant "associated planar"*

(CONTINUED)

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for a minimum center-to-center spacing of 29" and minimum edge-to-edge spacing of 12", the two parallel arrays may contain a total of 240 drums. The Mallinckrodt procedures are compatible with this criterion.

Storage of 5-gallon drums would also be safe in this facility. Because of the smaller size, the additional spacing dimensions would provide an added safety margin.

We recommend approval of the application insofar as the storage building and procedures are concerned, subject to the applicant's compliance with Section 70.24. We request information on the monitor-alarm system to be provided for this facility in order that we may determine that such plans are in accord with Section 70.24.

*Telecom  
of 5/31/60*

*Info to Swallow re 70.24 - they will submit  
additional details.*

Lyall Johnson, Chief  
Licensing Branch

Edson G. Case, Acting Chief  
Hazards Evaluation Branch

**MALLINCKRODT NUCLEAR CORP.**

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For 15-gallon containers (16.5" dia x 19.5" h) the shelves will provide 12" edge-to-edge and top-to-bottom spacing between drums. The drums will have a center-to-center spacing of 29" horizontally and 32" vertically. As noted above, the spacing (edge-to-edge) between containers in the parallel arrays on each side of the center shield will be 12'. The amount of material in each drum will be limited to the permissible values in Table II, TID-7019, which includes allowances for double-batching and optimum moderation, even though the material in the containers will be dry and the steel drums are clad with galvanized lids.

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