8-21-58

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MALLINCKRODT CHEMICAL WORKS REQUEST FOR UNIFORM SHIPPING CONTAINERS

In reply to your memorandum of July 16 concerning Mallinckrodt's request for the establishment of a minimum spacing for shipping containers, we have considered the problem and have the following comments:

The minimum spacing which is safe for any two particular "safe batches" is a function of the size and shape of the two units. It is also a function of the neutron multiplication of the individual batches, which in turn depends on the physical and nuclear properties of the material comprising them. Furthermore, the minimum safe spacing for a group of more than two units is different from that for two, and for multiple units the safe spacing depends not only upon the number of units but upon the way in which they are arranged.

Thus any universal figure for the distance to be maintained between "safe batches" must necessarily be larger than the minimum spacing that would be safe for most units. No value of spacing could be safe for any type of safe units, since many units which were only slightly subcritical could not safely be brought within even a considerable distance of each other.

A value of 24" has been applied as a quite general spacing standard. This figure should not, however, be interpreted as universal. It may reasonably be applied to units of relatively small size in a single one or two dimensional array, provided that the units are subcritical by the factors of safety which are quite generally applied in determining "safe batches" and which are incorporated in most of the published critical mass data collections.

For these reasons we have not yet been able to accept a single value of spacing which may be utilized under any condition, without consideration of the other factors involved.

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A somewhat general guide for spacing, which takes into account the size, number, shape, and multiplication of the units involved may be found in the unclassified version of K-1019, Fourth Revision. Other guides are given in some of the other critical mass data collections, including LA-2063 and LA-1875.

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