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# MALLINCKRODT CHEMICAL WORKS

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*Mallinckrodt*  
FINE CHEMICALS  
Standard Since 1867

AIR MAIL

March 5, 1957

MAR 5 1957

Mr. Lyall Johnson  
Chief, Licensing Division  
U. S. Atomic Energy Commission  
1901 Constitution Avenue  
Washington 25, D. C.



Dear Mr. Johnson:

As you know, movement of uranium hexafluoride from Oak Ridge to our plant at Hematite, Missouri, has been made by truck accompanied by technical personnel from Mallinckrodt. This is, of course, a very cumbersome, and, from our standpoint, rather unsatisfactory way to accomplish this shipment.

We have evaluated several alternate possibilities of handling UF<sub>6</sub> and request your approval for making such shipments by use of common carrier, either motor or rail. We request approval of the use of these common carriers for the shipment of uranium hexafluoride in cylinders as unmixed, unescorted, sealed loads. In the case of the enriched UF<sub>6</sub>, cylinders will in all cases be enclosed in bird cages to provide requisite separation between adjacent cylinders. We are enclosing our blueprint no. 3226-1 which shows the details of the bird cage which we would use for the small cylinders which contain high assay UF<sub>6</sub>. For low assay material which the Commission packages in larger cylinders, we would employ the bird cage shown in our enclosed print no. 3226-3. We would in all cases specify that the load be unstacked and properly anchored to the carrier. In the event of truck shipment, which we would expect to use generally, the trucking company would be furnished a copy of specific instructions for their driver concerning action that he should take in case of emergencies enroute. These instructions would cover such points as (1) precautions to take to prevent curiosity seekers from approaching the truck, (2) specific instructions to call shippers agent in St. Louis who would in turn notify Mallinckrodt technical personnel as well as provide replacement equipment should it be necessary and, (3) recommendations to local police as to methods of procedure until authorized technical personnel might arrive at the scene.

*Handwritten notes:*  
J. Lyall  
3-5-57  
AT

*Handwritten:* E-41

March 5, 1957

We believe, that shipment as outlined above, offers almost the same degree of safety and security as is provided in escorted shipments. The main hazards resulting from handling of  $UF_6$  are the poisonous nature of the hydrolysis products and in the case of the enriched material, the criticality hazards. Methods of packing and handling should prevent any difficulties from these potential hazards except in the case of accident. Accidents, of course, cannot be prevented by use of a technical escort. Should a cylinder be ruptured as a result of an accident, the technical escort could probably do nothing to control the release of the hydrolysis products. Should the bird cages be smashed in an accident and the truck submerged in water, a critical accident might occur. Again, there is little if anything a technical escort could do to correct the difficulties. It seems to us that in general, the truck driver can provide as much protection to third parties as could a technical escort. The main precaution would seem to be to keep unauthorized people away from the scene of an accident. As a means of accomplishing this, we would suggest equipping the transportation companies with signs for the truckers to use in addition to his regular equipment of flares or flags which the driver could place around a wrecked vehicle.

We believe that the transportation of the solid uranium products from our plant such as  $UO_2$ ,  $UO_3$ ,  $U_3O_8$ , uranyl sulfate and ammonium diuranate present a considerably smaller hazard than the transportation of  $UF_6$ . The main hazard in the case of the solid materials is that of criticality. We have designed two bird cages for the specific purpose of transporting solid uranium compounds. The attached blueprint no. 3226-5 is designed for highly enriched uranium compounds. Drawing no. 3226-4 shows the bird cage designed for material enriched up to approximately 3%. The smaller container utilizes the principle of "always safe geometry" and the larger one will only be loaded in the amount of the "always safe" quantity. The spacing provided by the bird cages will prevent adjacent containers from interaction. As in the case of the  $UF_6$ , we believe that these materials can be safely shipped by common carrier, motor or rail. Shipment would be made in unmixed, unescorted, sealed loads and loads would be single decked and properly anchored to the carrier. Specific instructions would be provided for use in the event of emergency as previously outlined. We also request your approval on individual single container shipments by rail express and in the case of the small bird cage shown in print no. 3226-5, we request approval for single container shipments by air express or air freight unescorted.

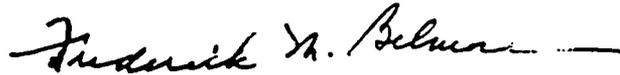
Mr. L. Johnson

-3-

March 5, 1957

We would appreciate your early action on the problem of shipment of enriched materials since there seems to be some confusion as to the role of the Atomic Energy Commission, the Bureau of Explosives, the Interstate Commerce Commission and the individual licensee in this matter.

Very truly yours,



Frederick M. Belmore  
Special Asst. to the President

FMB/ck

Enclosures

City of St. Louis  
State of Missouri

Subscribed and sworn to before me this 5th day of March, 1957.

 Notary Public

My Commission Expires Dec. 7, 1960