

# MALLINCKRODT CHEMICAL WORKS

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MALLINCKRODT ST. LOUIS, MO.

7 April 1958

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*Mallinckrodt*  
FINE CHEMICALS  
Standard Since 1867

Mr. Lyall Johnson  
Licensing Division  
U. S. Atomic Energy Commission  
Washington, D.C.

SUBJECT: Special Nuclear Materials License SKM-33

Dear Mr. Johnson:

In the manufacturing process licensed for Hematite, Missouri, we generate substantial quantities of ammonium fluoride solutions from the precipitation of ammonium dichromate. Our current procedure for handling this material is to treat it with lime to precipitate the fluoride values, bring the slurry to the boiling point to release the ammonia, filter out the calcium fluoride residues and send the essentially pure water to the stream. The calcium fluoride residues are being stored in drums under cover at the plant site.

A process is in operation in our main plant in St. Louis, Missouri which can utilize all of the ammonium fluoride solution that is generated at the Hematite, Missouri plant. These filtrates have been repeatedly analyzed as a routine process control measure and have been found to contain an average maximum of 50 ppm soluble uranium, with the average values in the range of 5 to 20 ppm of soluble uranium. This uranium is not recovered by the lime treatment.

We are planning to cease the lime treatment of the ammonium fluoride residues and transport these solutions by company-owned tank wagon to our main works at St. Louis for utilization of this valuable by-product. We are proposing to purchase a 5000 gallon tank wagon. Because of weight limitations on axle loading on Missouri highways, we will load this tank to a maximum of about 3500 gallons.

In the course of our operations we have made routine checks on the uranium content of these filtrates and we find that even if the tank were completely filled with our solutions that we would fall under the exemption for transportation listed in AEC Regulations 10 CFR 71, Section 71.22 which specifically exempts up to 350 grams U<sup>235</sup> from prior approval permission for shipment. Our calculations show that more than 99% of our effluent ammonium fluoride liquors are produced in that section of our plant licensed to handle up to a maximum of 5% enriched U<sup>235</sup>, the other 1% coming from the higher enrichment section of our licensed

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operation. Maximum solubility of uranium in our process liquors has been shown by tests to be 50 ppm. Assuming an 8-1/2 pounds per gallon solution weight, this gives us a maximum weight per load of approximately 40,000 pounds. If all of the material were 50 ppm this would give us a 2 pound content of uranium. If the tank truck were to be made up of filtrates from the processing of the maximum assay licensed in our two plants, we should have .11 pound (45 grams) of  $U^{235}$  from the 5% enrichment material and .02 pound (10 grams)  $U^{235}$  from the processing of highly enriched uranium making a total maximum load possible in the truck of 55 grams  $U^{235}$ .

The process in which it is planned to use the ammonium fluoride solutions will not be affected by the minute quantity of uranium present. The effluents from this process will be combined with other effluents in our main plant process sewers and will result in greater dilution than at our Hematite, Missouri plant. Because these process sewers are under our complete control and on our property as contrasted with the open creek at Hematite, we believe that this method of handling is an improvement.

In our opinion, this utilization of an otherwise wasted material is beneficial to the overall national economy. We believe, also, that adequate protection is provided under the conditions described above from the standpoint of: transportation safety, criticality safety, and stream pollution. It is not completely clear to us whether our proposed action need be covered by a modification to our Special Nuclear Materials License. If you feel that it should be so covered, however, we request that SNM-33 be so amended.

Very truly yours,

MALLINCKRODT CHEMICAL WORKS

*W. M. Leaders*

W. M. Leaders  
Technical Director  
Special Metals Division

WML:dj