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August 9, 1956

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

Dear Mr. Johnson:

This will constitute a supplement to the original application for a license to handle special nuclear material filed on May 15, 1956 and supplemented by letters dated June 13, 1956 and July 10, 1956. This supplement has been prepared to furnish additional information requested by Mr. Joe Delaney of your office. For convenience, the material is being submitted in question and answer form, as follows:

1. Q. You state that, after hydrolysis of the UF_6, subsequent processing will be done in 0.7 pound batches. How is the hydrolysized material separated into 0.7 pound batch quantities?

   A. We attempt to control the quantity of uranium that will be contained in a hydrolysis batch by metering the UF_6 into the hydrolysis tank by a weight change on a 300 pound capacity scale having a 3 pound by 1/4 ounce beam. The weight of the cylinder, the contents and heating mantle, all of which are weighed on this scale, is about 125 pounds. The UF_6 cylinder is connected in service by a flexible metal hose to the UF_6 handling system. As a back-up measure to insure that no more than 0.7 pound of uranium is removed from the hydrolysis equipment as a single batch, the ammonium hydroxide used to precipitate ammonium diuranate is carefully metered into the "always safe" geometry 5" diameter hydrolysis tank. A quantity of ammonium hydroxide sufficient to neutralize the HF and precipitate 0.7 pound of uranium is metered into a reservoir prior to the hydrolysis of a single batch of UF_6. No additional ammonium hydroxide is then available for that particular batch of UF_6. At the completion of hydrolysis, a sample of the ammonium diuranate slurry is withdrawn and filtered. The filtrate is titrated for excess ammonia to insure (1) complete precipitation of the uranium from solution, and (2) that uranium in excess of 0.7 has not entered the batch. In the event too much UF_6 has been added, a smaller than normal amount of excess ammonia in the filtrate would result, indicating there had been an error in metering in the UF_6. The situation would then be taken care of while the slurry was still contained in the "always safe" hydrolysis tank by removing the proper amount of slurry containing 0.7 pound of uranium.

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2. Q. The hydrolysis hood you state is curbed for a depth of 4" and will have sufficient capacity to hold the entire contents of the hydrolysis system. This is not a geometrically safe system for highly enriched material. Will the hood be modified to be geometrically safe or will batch control be used to prevent accidental criticality? If batch control, please describe how control will be exercised.

A. The depth of the pan in the hydrolysis hood has now been changed so that it will hold a maximum of 1" of any solution which might be spilled into it. This has been accomplished by cutting the curbing to a one inch height. This 1" pan will be sufficient to contain the entire contents of the hydrolysis system present in the hood at any one time.

3. Q. The 4" deep by 12" diameter filter is very close to a geometry which can be made critical at top enrichment. Is the batch limit planned and if so, what limit and how will it be insured?

A. The filters in this process have now been changed to 4" in depth and 5 3/4" in diameter. Two filters are used to receive the ammonium diuranate cake from each batch and these filters are spaced on 2' 8" centers. Only one batch, limited in size as described above, is present in this filtering area at one time.

4. Q. You state that moist filter cakes will be removed from the filter in batches containing 0.7 pound. How are batches limited to this size?

A. The filter cake from a single batch is loaded into a single tray and these trays are 7 3/4 x 5" and 1 13/16" deep. The batch size is limited as described above. Four to six trays are dried at one time in a single layer in an oven having a single shelf 18" x 15". A grid in the drying chamber of the oven will not permit the trays to be stacked.

5. Q. In general, in processes where safety dependence is planned on batch size control rather than "always safe" conditions, you should provide additional information on the system of checks and balances intended to insure proper control.

A. Additional information on the "system of checks and balances intended to insure proper control" is given below for those steps of the process in which the enriched uranium is handled as a slurry or wet filter cake. These "wet steps" of the process, where the greatest handling precautions are required, are discussed individually.

a. Hydrolysis

The hydrolysis of UF_6 is carried out in "always safe" geometry 5" cylindrical tank and an "always safe" batch size is insured by the steps outlined in answer 1 above. There is only one hydrolysis tank in the hydrolysis hood and hydrolysis slurry must be transferred to the filtration hood before the next "always safe" batch of UF_6 can be hydrolysized.

b. Filtration

Filtration is carried out on a single batch of slurry transferred from the hydrolysis hood. The wet filter cake from this step of the process is removed from the hood before additional slurry is allowed to enter the filtration equipment. A time interval of about one hour separates the production of hydrolysis batches and the removal of one batch as filtered cake is insured by instruction and supervision before the next batch is received from the hydrolysis system.

c. Loading the Drying Oven

As soon as a single batch is filtered in the two "always safe" geometry filters used for each batch, the filters are unloaded into a single tray described in answer 4 above. This tray is then loaded into the drying oven. The interval between consecutive trays entering the oven is about one hour. As pointed out above, the oven is so constructed that these trays can only be placed side by side and not stacked vertically in the oven.

The remainder of the process in which the enriched uranium is handled dry is discussed briefly even though in these steps the possibility of a critical accident would be remote. As indicated in our flow sheets and plant layout, the material is handled essentially in dry boxes. The plant production will be four to eight pounds per day and a maximum of three days production will be present in the dry portion of the process at any time. In general, uranium in this part of the process will be handled in about 0.7 pound batches. UO_2 product will, however, be accumulated in the packaging step in a 5" diameter package holding about ten pounds. Inventory control will be used to insure that no more than about twenty-five pounds of UO_2 are accumulated in the dry portion of the process at any time. In general, this material will be spread throughout the process in 0.7 pound batches.

We sincerely hope that these answers will provide you with the necessary information to expedite the granting of our special nuclear materials license. If, however, there are further points that need clarification, we would appreciate early notification from you so that minimum delay will be encountered. As you know, our plant must be in operation on top enrichment material by about September 1 if we are to fulfill the requirements of the reactor program of private industry.

Very truly yours,

Joseph Fistere

Joseph Fistere
President

JF:WML:dj

Sworn to, before me, this 10th. day of August, 1956.
City of St. Louis
State of Missouri

Marie A. Granger
NOTARY PUBLIC
My commission expires Dec. 10, 1958.