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# MICHIGAN CHEMICAL CORPORATION

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May 4, 1965

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Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch
Division of Materials Licensing
Atomic Energy Commission
Washington, D. C.

Dear Mr. Nussbaumer:

This will acknowledge your letter of April 12, 1965.

It would be sheer speculation for us at this time to attempt to answer the questions which you have raised. For this reason we are hereby withdrawing the application which we filed March 10, 1965, and are simultaneously filing a new application to conduct laboratory and pilot plant studies which will permit us to give valid answers to the questions which you have raised. In addition, these studies will establish the chemicaldesign of the plant. After we have completed these studies we plan to request a license to operate a commercial plant.

The pilot plant will consist of a 100-gal. glass lined reactor and associated equipment. A sketch of the equipment is attached. Raw material will be delivered to the plant in steel drums. The raw material is a thick paste or mud which consists of 40% solids and 60% water. The raw material contains a small amount of thorium. One drum was found to contain 3.6% $ThO_2$ on the dry basis (1.5% on the wet basis). Another drum contained less than 0.1% $ThO_2$ on the dry basis (less than 0.04% $ThO_2$ on the wet basis). This wet mud will be charged into a glass lined reactor (A) and sufficient water will be added to yield a mixture that is fluid and can be readily agitated. The reactor will then be closed, a slight vacuum will be applied by means of a steam jet, and sufficient sulfuric acid will be added to the reactor to dissolve the rare earth oxides but insufficient to dissolve the $ThO_2$. It has been shown that this can be accomplished by adding one pound of 96% $H_2SO_4$ for seven pounds of mud. We will use 80 lb. of wet mud for each charge and will add 11.4 lb. of 96% $H_2SO_4$. A small amount of $CO_2$ gas will be evolved during the addition of $H_2SO_4$. This gas will be drawn thru the water scrubber (B) by means of the vacuum.

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After completion of the reaction the slurry in the reactor will be pumped into the filter press (C). The filtrate from the press contains the rare earth elements. After completion of the filtration the filter cake will be shoveled out of the press into steel drums. We anticipate that this filter cake will be a mud having a water content of about 60%, just as the feed material did. These steel drums will be closed and shipped by common carrier to Nuclear Fuel Services, West Valley, New York for burial.

We will make five pilot plant runs in each of which we will use 80 lb. of mud (32 lb. on the dry basis). Thus the total raw material used for the pilot plant work will be 400 lb. of mud (160 lb. on the dry basis).

In addition to this pilot plant work we need to establish the uniformity of the feed material. For this purpose we need nine drums of feed material. Each of these drums contains 250 lb. of wet mud. Thus the total amount of wet mud required is 2250 lb. (900 lb. on the dry basis). Each of these drums will be analyzed individually by removing a representative sample of material from the drum and delivering it to the laboratory for analysis. The sample will be analyzed by X-ray fluorescence for yttrium oxide and thorium oxide.

After removing the 400 lb. of wet mud that is required for the pilot plant work the remaining drums, which will contain 1850 lb. of wet mud, will be closed and set to one side until we are granted a license to process larger amounts of material. In the event of failure to obtain such a license this material will be shipped to Nuclear Fuel Services for burial.

Accordingly, we request a license to purchase 2250 lb. of wet mud containing approximately 40% solids (900 lb. solids) and to process approximately 400 lb. of this mud in the pilot plant.

We have retained the services of Dr. G. Hoyt Whipple a Certified Health Physicist of the University of Michigan to take whatever samples are required during the operation of the pilot plant and to analyze these samples for radioactivity by appropriate laboratory instruments. These analyses will be used to calculate the concentration of radioactive materials in the air in the pilot plant, in the several process streams and in the products. Specifically, samples will be taken from the reactor vent both before and after the water scrubber. The filter cake and the filtrate from the press will be sampled and analyzed. The air over the filter press will be sampled during times that the press is open and radioactive materials could escape into the air. The general housekeeping conditions will be determined by smear samples which will be assayed for radioactivity by suitable laboratory instruments. Each pilot plant run will be under the health physics supervision of Dr. G. Hoyt Whipple. If you have any questions regarding the health physis phase of the pilot plant work you are hereby authorized to contact Dr. Whipple directly or in his absence with Dr. Donald E. Barber. Both men may be reached on telephone 764-5443 area code 313.

Since this description of our plans for the operation of a pilot plant and the attached pilot plant diagram contain proprietary information, we respectfully request that they be maintained confidential.

Sincerely yours,

Dwight Williams

Dwight Williams
Technical Assistant
to the President

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