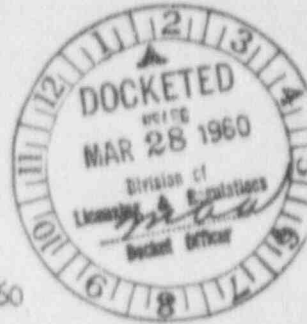


THE CARBORUNDUM COMPANY

THE CARBORUNDUM METALS COMPANY DIVISION

P. O. BOX 22 • AKRON, NEW YORK

March 25, 1960



Mr. J. C. Delaney
Chief, Nuclear Materials Section
Licensing Branch
Division of Licensing and Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

DOCKET NO. 40-5001

Dear Mr. Delaney:

Pursuant to your request, we are attaching herewith two copies of the preliminary report on the activities of The Carborundum Metals Company with respect to processing of Nigerian zircon containing up to 8% ThO_2 . My letter of November 27, 1959, directed to Mr. N. Doulos, contained a descriptive account of the processing of ore to zirconium and hafnium metals. To date we have completed only the first step in this processing, that where silicate ore is converted to a carbide form. The attached report therefore covers only this portion of the processing.

It was our belief that the carbide operation was the most critical with respect to containment of the radioactive hazard, as all of the subsequent processing steps, unlike the carbide step, are well contained, controlled and understood. In addition, preliminary calculations indicated that radioactive contaminants would be separated from the zirconium and hafnium in a natural manner on each step of the process, thereby reducing the magnitude of the hazard at each succeeding step. Data on the carbide has substantiated these predictions in that the thorium content of zirconium carbide so far produced contains an average of only 1% ThO_2 as compared to 3.8% to 8.0% found in the ore. This is resulting in a slight build-up of thorium in the unreacted ore which is recycled.

Our original intention was to make additional carbide runs in an attempt to obtain as completely as possible all data with respect to the radioactive hazard associated with this operation. Your reluctance to extend our source license No. C-4960 for this purpose without the opportunity to review data secured on the operation so far conducted has resulted in a change in our original plans. On March 21, 1960, we commenced to chlorinate carbide produced from Nigerian ore. It is our intention to conduct this operation in much the same conservative manner as employed for the carbide step, even though the radioactive content of the feed has been reduced by a factor of at least 3. Furthermore, we do not believe that ThO_2 or TiO_2 will chlorinate in the presence of ZrO or ZrO_2 ; if chlorination does occur, the extremely low vapor pressure of ThCl_4 (as compared to ZrCl_4 at 400°C .) virtually eliminates its carryover with ZrCl_4 as a gas to the condenser.

Until such time as conclusive data so indicates to the contrary, we are conducting chlorination under the following conditions:

1. Daily change of overalls, caps and gloves for all workers in the area.

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2. Use of respirators by all workers in the area.
3. Delineation of the specific chlorination area as one containing a radioactive hazard.
4. Air samples are being taken and counted in the affected area.
5. Liquid wastes from the area are being sampled and counted.

We assume that chlorination and any further processing will be included under the processing license mentioned earlier. (We would appreciate a clarification on this point and an indication as to what level of thorium your interest begins. It may very well be that the level of thorium in $ZrCl_4$ produced from the chlorination step may be so low as to no longer interest the Licensing Branch.)

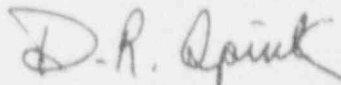
It is our expectation that chlorination of all carbide so far produced from Nigerian ore will take about 20 days of processing or until about the 10th of April. As of the moment, we do not expect to be ready for the second carbiding campaign until May 1960 at the earliest. We would like very much to carry the present accumulation of some 100,000 pounds of carbide so far produced through the chlorination and subsequent hafnium-zirconium separation step in this interim, and obtain as much pertinent information as possible. In view of the present license expiration date of March 31, 1960, extension of this license for the specific purposes outlined above is most earnestly solicited.

With reference to the attached report issued by Dr. G. Hoyt Whipple and his associates, we feel that it is an excellent and most complete report of the activities so far conducted. One comment that seemed pertinent concerns the off-site sampling procedure. All of these samples were taken either directly in the plume emanating from the stack or directly beneath this plume, and therefore are representative of the maximum possible off-site concentrations of radioactivity. The report recommendation for continuous off-site sampling will almost certainly point out this situation. For the purpose of obtaining continuous off-site air samples, we have purchased Model NA7 Nuclear Air Samplers made by the Galman Instrument Company.

We are most interested in cooperating with the AEC in the fulfillment of its regulations; therefore, if any further information is required at this time, please let us know. Your earliest action on the extension of our present license for the specific purpose of completing the chlorination and liquid-liquid extraction steps will be most appreciated.

Very truly yours,

THE CARBORUNDUM METALS COMPANY



D. R. Spink, Assistant to Manager
Technical Branch

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Attachments