THE DOW CHEMICAL COMPANY
MIDLAND MICHIGAN

40-17

For Div. of Compliance

March 30, 1962

The Atomic Energy Commission
Mr. Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch
Division of Licensing and Regulation
Washington 25, D.C.

Gentlemen:

Please refer to your letter of March 23, 1962 (40-17) signed by Mr. Donald A. Nussbaumer. This covered our application for renewal of Source Material License No. STB-527. We have obtained from our engineers the following information in answer to the two requests in your letter.

Your first question concerns our statement in Item 11(c) which indicates that local exhaust is employed for welding operations where required to minimize airborne thorium and daughters and the statement in comment No. 2 that exhaust installations are not necessary under our conditions of operation. We do not feel that these are conflicting statements in that a change in type of welding or welding procedures could present a situation where local exhaust ventilation would be necessary to maintain an adequately low level of airborne thorium and daughters in the breathing zone of the operator.

We would like to justify our position on this question. On August 14, 1959, our Mr. John A. Peloubet visited your offices and discussed our welding survey data with your Mr. Nussbaumer. The information was conveyed to you for your Radiation Safety files in Mr. Peloubet's letter of August 28, 1959 to Mr. Lester R. Rogers. A copy of this correspondence is attached for ready reference. It should be noted that this letter was written before the issuance of the January 1, 1961 edition of 10 CFR 20. This edition clarified the calculation of weight of thorium based on amounts in terms of curies. The values quoted are therefore altered upwards such that the current airborne limit of 3×10^{-11} µc/ml is equivalent to 270 $\mu g/m^3$.

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As shown in the referenced letter, measurements in the breathing zone of the welding operator at the mask ranged from less than 2 to 100 $\mu g/m^3$ without local exhaust. As explained, the maximum time of exposure is about 20% which would permit 5 x 270 or 1350 $\mu g/m^3$ during the actual welding time. Natural convection brings the airborne concentration to levels of 2 $\mu g/m^3$ or less between welding operations. The minimum safety factor during welding becomes 13 and is normally much higher.

In our Bulletin 141-179 which you have in your files, we have retained the sketch of a suggested local exhaust system as a guide to others in eliminating possible airborne thorium until such time as a survey by direct measurement or otherwise has proven the local exhaust to be unnecessary. This is simply an added safety factor where ventilation conditions are unknown.

Question No. 2 relates to a detailed description of the monitor mentioned in Item 11(c) in connection with the ventilation system. This effluent monitor reference concerns our plant at Madison, Illinois where magnesium and thorium are alloyed to produce magnesium-3% thorium in the form of cast ingots and billets for rolling and extrusion processes.

The term "monitor" applies to a standard type of factory roof line such as is seen in the attached photograph of a portion of our plant. The monitor construction includes a series of hinged windows just above the sub roof level which are open during the operation of foundry equipment for alloying and casting. The use of roof venting of this type is equivalent to a large vent stack with a negative pressure head based on the 65 foot height of the open interior of the building. In actual practice, the best natural draft was obtained by the opening of windows in specific locations and tack welding the frame open to prevent alteration.

In addition to the natural draft through the open monitor windows, the alloying and casting areas are equipped with ventilating fans exhausting through the roof. They have a total capacity of 722,000 cubic feet per minute.

The monitor window and exhaust fan venting system was designed to handle the fumes from the alloying and casting of all types of magnesium alloys. After the thorium alloys were added as production items a survey was made to insure that the existing system was adequate to keep airborne thorium and daughters below published standards. A description of this survey as presented to the Health Physics Society is attached. The high values indicated for Ra 228 in two locations were three times tolerance for sample 1 (temporary cutting torch operation) and just below tolerance for sample 2, referring to the levels published in the current 10 CFR 20. All other measurements showed Ra 228 and Th 232 to be well below tolerance or absent.

The magnesium-thorium alloy sheet, plate and extrusions produced with the thorium obtained under license STB-527 are used primarily in missile construction for both structural and electronic components. These materials are valued in excess of a million dollars per year. In view of the obvious need for this production we trust that you will issue a three year renewal license at an early date.

Please increase item 8 on our AEC-2 form column (d) to 10,000 pounds of oxide or fluoride instead of 2,000 pounds as stated. Section 8 (e) would then be changed from 102,000 pounds to 110,000 pounds.

As in the past, we wish to cooperate fully with the U. S. Atomic Energy Commission in making available to the Commission and to private industry information that will promote the safe handling of magnesium-thorium alloys. Please feel free to call upon our technical personnel to aid in resolving problems related to this subject.

Very truly yours,

W. Otis Heath

W. Otis Heath, Statistician

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