ENGELHARD INDUSTRIES, INC.

D. E. MAKEPEACE DIVISION
PINE & DUNHAM STREETS
ATTLEBORO, MASS.
ATTLEBORO 1-0090

November 23, 1959

Director,
Division of Civilian Application
U. S. Atomic Energy Commission
Washington 25, D. C.

Gentlemen:

As part of our radiation protection program we require that our nuclear employees wear film badges which are changed bi-weekly to indicate beta-gamma exposures. This service is performed for us by the Nucleonics Corporation of America.

In the period from 10/16 - 10/30 of this year we were informed that one of our employees had received an exposure of 400 millirems beta and 2300 millirems gamma. The individual who was involved was working as a melter's helper on our vacuum induction furnace which melts large quantities of both depleted and enriched uranium. Most of the other personnel who are working at the same job have been receiving fairly high beta exposures but little or no gamma.

The actual duties performed by this person included the cleaning of the furnace interior before and after melting. A considerable quantity of uranium oxide is retained on the furnace shell due to melting. This is ordinarily removed by wire brushing and wiping with trichlorethylene. In addition to the cleaning of the furnace, this individual was also responsible for cleaning the graphite crucibles and molds used in the melting operations. This cleaning operation is performed in a hood as it also generates a good deal of dust and oxide.

Prior to the exposure which was indicated above, the individual had received an exposure of 1750 millirems of beta and 65 millirems gamma for the period 10/3 - 10/9 and an exposure of 550 millirems beta and 410 millirems gamma for the period 10/10 - 10/15. The latter gamma exposure was reported as being damaged, i.e. spotted. The reason that the above exposures were reported on a weekly basis is that a different film badge was used each week.

It is our belief that based on the above results and similar ones which we have received that the plastic film badge holders become contaminated with radioactive material and thus do not give a true weekly exposure of the individual. To test this hypothesis we have switched the holders of melting personnel with people who have little or no contact with radioactive material. As yet we have not returned these films to Nucleonics and thus do not know whether our assumption is correct.

We are also covering the badges of our melting personnel with thin plastic in an effort to prevent contamination of the holders and film. The personnel with the highest exposures including the individual mentioned above have been transferred from the furnace until exposure levels are lowered and our assumptions proved correct.

A copy of our letter to the Chicago Operations Office with regard to the high exposures of our melters and the corrective actions we are taking is enclosed along with their reply. We will keep you informed of further developments.

Very truly yours,

D. E. MAKEPEACE DIVISION

Norton M. Weiss

Norton M. Weiss
Health & Safety Officer

NMW:dc

Enclosures (2)

Copy to:
Mr. Robert W. Kirkman, NYOO - AEC

October 15, 1959

U. S. Atomic Energy Commission
Chicago Operations Office
P.O. Box 59
Lemont, Illinois

Attention: Donald M. Gardiner, Director
Health and Safety Division

Dear Mr. Gardiner,

As per our telephone conversation of a short time ago, I am writing to inform you of some radiation overexposures to our personnel and of the corrective action we are taking to prevent reoccurrence.

The personnel involved have been working in our melting section and were involved in melting a considerable quantity of both depleted and enriched uranium. The man with the highest exposure received two successive bi-weekly doses of 1.3r and 1.5r of beta radiation respectively. He has been transferred to our sodium bonding department, which involves a minimum of radiation exposure, for a period of two months. Other personnel in the melting area received considerably smaller exposures.

It is our feeling that most of this radiation was received while preparing and cleaning graphite molds and crucibles which are used for melting of uranium alloys. These operations had been performed in a hood with a plexiglass front which contained port holes for access. We are now in the process of converting these hoods to glove boxes which will eliminate actual contact with the contaminated materials.

In addition, we are setting maximum limits on the numbers of times which a crucible or mold may safely be used. When this limit has been reached, the crucible and mold will be packed in steel drums and sent to a storage area for cooling off. We have already ordered an additional supply of new crucibles and molds to enable us to do this.

Another source of radiation is the furnace itself which becomes very hot after repeated melting. We are trying to minimize the time which must be spent inside the furnace by the personnel to include only that amount of time necessary to charge the crucible. The furnace is cleaned after every melt by wire brushing and wiping with trichlorethylene. We have set this up so that most of the cleaning may be done from outside the furnace. Only local areas inside the furnace which cannot be reached from the outside will require that a man enter the furnace proper and this time will be held to a minimum.

October 15, 1959

We are also setting up procedures to thoroughly wash and decontaminate the furnace by trained personnel. This will be done as often as is found necessary, either weekly or bi-weekly seems most likely at the present time.

As a further check on this problem we are requesting that our melting personnel have weekly film badge changes rather than bi-weekly in order to alert us to any overexposure as soon as possible.

I would appreciate your comments or suggestions as to the handling of this particular problem.

Very truly yours,

D. E. MAKEPEACE DIVISION

Morton Weiss
Health & Safety Officer

MW:ds

Copy to:
Mr. Dave Smith (AEC) Chicago

Mr. H. Barney

UNITED STATES
ATOMIC ENERGY COMMISSION
CHICAGO OPERATIONS OFFICE
P. O. Box 59
LEMONT, ILLINOIS

October 23, 1959

Mr. Norton Weiss
Health and Safety Officer
D. E. Makepeace Division
Pine and Dunham Streets
Attleboro, Massachusetts

Dear Norton:

After reading your October 15 letter to Don Gardiner and discussing this situation over the telephone with you, I would like to make a few comments regarding your melting operation exposures.

1. Personnel Exposures. You indicate that one of your workers received a total beta dose of about 3 rep in a one month period. With the allowable dose at 6 rep per quarter (see the addendum to NBS Handbook 59), this means that this man received half the quarterly dose in one third the time. As a result, his exposure should be controlled to insure that in the next two months he will not receive more than 3 rep. Now, if you have taken steps to prevent such exposures in the future by making procedural changes or equipment modifications, this may accomplish the desired exposure control, and it will be unnecessary to take the man off the job. From a public relations point of view (considering legal, union and psychological factors), it is normally better, if possible, to leave a man on the job and control his exposure, rather than to remove him from the exposure.

   From what you described in your letter, you have certainly taken some sensible measures to control the exposures in the melting operations. Other firms have had similar difficulties, and have had to resort to such measures to combat them.

2. Film Badges. Inasmuch as you have already taken steps to reduce the exposures, and will no longer be pushing the maximum permissible doses, I would suggest keeping the bi-weekly film badge system. As you double the number of film badge systems in effect, you may multiply your administrative work load in that phase by four.

By now you are probably aware of the "minor" criticality accident that occurred at the Chemical Processing Plant in Idaho on October 16. The CPP personnel had done a complete review of their criticality control procedures twice within the past year (after the Y-12 and LASL accidents), and then had an accident anyway. This does not mean that reviews are not valuable, but means that the reviews were evidently not thorough enough. We cannot know how many accidents were prevented as a result of the reviews that were made. I would suggest that you start a complete review of your operations to investigate some of the "low risk" areas where "criticality can't happen." I'll be glad to give you a hand.

Very truly yours,

William A. Brobst
Radiological Physicist
Health and Safety Division