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Metal Division

SAMUEL R. HOLLINGSWORTH, MANAGER
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NATIONAL LEAD COMPANY

Atlantic Branch

Manufacturers of "DUTCH BOY" PRODUCTS

SAMUEL R. HOLLINGSWORTH
MANAGER

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P. O. BOX 831
PERTH AMBOY - VALLEY 6-6000
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PERTH AMBOY, N. J.
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Isotopes Branch
Division of Licensing & Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

March 5, 1963

Attention: Mr. Robert E. Brinkman

Reference: L&R:IB:GWK (49403)

Dear Sir:

Reference is made to your letter of February 25, 1963, in which you requested our application for a byproduct material license, to use I-131 as a tracer in cored solder studies, be submitted pursuant to Section 30.24 (h) of 10 CFR 30.

Our preliminary analyses of the proposed use of I-131, as a developmental radioactive tracer, to determine flux "skips" in cored solder production is as follows:

1. Eight day I-131 will be added to solder flux in a well filtered exhaust hood. The area around the hood will be posted and monitored in conformance to 10 CFR 20. Samples will be taken from the "spiked" flux to verify homogeniety and concentration of I-131 per gram of flux.

2. The "spiked" flux will be introduced into a conventional solder extrusion machine in the normal manner. Restricted areas will be posted in accordance to 10 CFR 20.

3. Two - 2" NaI crystals will be used to observe the presence of the I-131 in the solder core; the first crystal will monitor the solder soon after extrusion and the second crystal will detect the I-131 after the solder has been reduced to final size.

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ACKNOWLEDGED

4. Calculations indicate that (a.) the physical geometry affords that the crystals will detect about 23% of the I-131 radiation, (b.) efficiency of the crystals for a mean energy gamma of 0.38 mev is 10% and (c.) about 66% of the gammas will penetrate the Pb-Sn solder wall. Thus, each gram of solder initially will contain 0.001 microcuries of I-131 for a positive identification of the flux.

5. To reduce the I-131 to a level of 2×10^{-5} microcuries per gram, a retention time of the solder will be at least 45 days, provided the above concentration of 0.001 microcuries of I-131 per gram is maintained.

6. The ultimate utilization of this solder is in the electronics industry. Here, "spot" type solder applications are in predominance, where a maximum of 0.1 grams is used in each solder joint. Assuming each 0.1 gram solder joint contained 2×10^{-6} microcuries, an operator breathes air about 25 centimeters from this solder joint and that the I-131 diffuses in a two pi geometry, then the concentration of the I-131 would be about 6×10^{-11} microcuries per cubic centimeter of air, which is less than the acceptable concentration of 3×10^{-9} microcuries per cubic centimeter listed in 10 CFR 30.73 Column I.

7. Since the application of solder is of a "spot" type, we do not see any possible means of reconcentration of the I-131.

8. By accurate assay of the I-131 introduced into the solder flux and proper accounting of the finished solder and decay - hold time, assurance can be made that the I-131 will not exceed 2×10^{-5} microcuries per gram of solder when sold through normal channels to the public.

Please find attached a new Item (15) Waste Disposal, which takes into account the most recent 10 CFR 30 regulations and corrects previous typing errors.

If additional information is required, please contact us.

Very truly yours,

James J. Cullen

J. J. Cullen
Radiological Officer

dk

Enclosure

RECEIVED
MAR 7 1963
U.S.A.E.C.
Isotopes Branch
Div. of L & R

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

NATIONAL LEAD COMPANY

Item (15) Waste Disposal

The I-131 will be added to the solder flux in a concentration which will permit detection in the finished cored solder. Preliminary calculations indicate this concentration to be 1.3×10^{-3} microcuries per linear inch of extruded solder.

Solder manufactured during these experimental tests will be retained by National Lead Company at Perth Amboy until the I-131 has decayed to less than 2×10^{-5} microcuries per gram of Sn-Pb alloy. After this lower limit has been attained, the solder will be sold through normal channels.

A record of standardization of the flux - I-131 concentration will be maintained. Verification of the 2×10^{-5} microcuries per gram of I-131 will be done using a 3" x 3" well type NaI crystal with a 400 channel RIDL Gamma Ray Spectrometer.

An annual report will be filed with the Director, Division of Licensing and Regulation, stating the concentration and quantity of I-131 in solder transferred to vendors.

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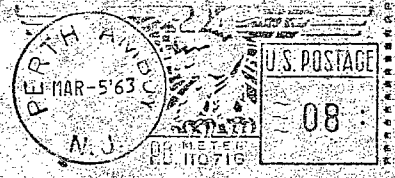
After 5 days return to
NATIONAL LEAD COMPANY
ATLANTIC BRANCH
P. O. BOX #831
Perth Amboy, N. J.



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VIA AIR MAIL

Att: Mr. Robert E. Brinkman