Routing

[redacted]

May 27, 1966

[redacted], D/212

[redacted] D/245

INSPECTION OF HI-LO SWITCH PLATES IN DEPARTMENT 212

As a follow up of our conversation of this week, routine handling of the subject plates should present no health hazard. In view of this, special protective measures will not be indicated.

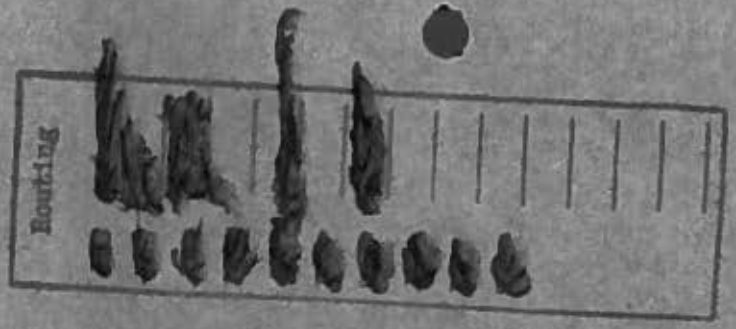
Health and Safety shall be contacted in the event the phosphor paint is removed by accidental chipping or any intended testing methods.

Personnel shall wash their hands upon termination of handling the subject items and prior to eating, drinking or smoking.

Your cooperation in this matter is appreciated.

[redacted] D/245
Health and Safety

[redacted]



May 27, 1966

[redacted] D/50
[redacted] D/586
[redacted] D/245

HEALTH AND SAFETY PROCEDURE FOR HANDLING TRITIUM LUMINOUS COMPOUND 115 GT

The following is required to insure adequate controls for handling the radioactive tritium phosphor powder and resultant mixed adhesive:

1. The powder shall be mixed with the adhesive in the Industrial Hygiene Laboratory fume hood to control any airborne or surface contamination.

2. The resultant working adhesive container shall be properly labeled as to radioactive contents at all times.

3. Suitable paper shall be placed on the working surface beneath the container and parts prior to painting.

4. Personnel shall wear rubber gloves and paper shop coats when applying the adhesive.

5. Personnel shall not smoke, eat or drink while applying the adhesive and shall wash their hands prior to smoking, eating or drinking and upon termination of working with the adhesive.

6. The paper, gloves, brush and any other contaminated items such as Kimwipes or shop coats shall be placed in a plastic bag and sealed. Health and Safety shall be contacted relative to identification and disposal at extension 2505 or 2637.

Your cooperation in this matter is appreciated.

[redacted] D/245
Health and Safety

[redacted]

DIST -

SANDIA CORPORATION
LIVERMORE LABORATORY
P. O. BOX 969 LIVERMORE, CALIFORNIA

NICKEL SULFAMATE PLATING
TRITIATED PHOSPHOR

March 2, 1966

To: [redacted] - 8215
Original Signed

From: [redacted] 8215

Re: Report on Trip to U. S. Radium Corp., Bloomsburg, Pa. Feb. 10, 1966

Ref: Correspondence dated Jan. 10, 1966 from [redacted], Bloomsburg Division, U. S. Radium Corp. to [redacted], Buyer, Scintilla Division, Bendix Corp.

A meeting was arranged at the U. S. Radium plant in Bloomsburg, Pa. to discuss the referenced correspondence.

Attending were:

[redacted], R & D Bloomsburg Division
[redacted], Sales Department, U. S. Radium Corp.
[redacted], Department 841, Bendix, Kansas City
[redacted], Purchasing Agent, Bendix, Kansas City
[redacted], Health Physicist, Sandia Corporation, Livermore

Prior to the arrival of the Bendix people, I discussed tritium contamination with [redacted]. I was primarily interested in his experience with contamination of materials as they were being processed and the allowable tritium contamination level at the U. S. Radium plant.

[redacted] stated that U. S. Radium had experienced contamination problems during the baking of the first cover coat and during wipe down of the plates. He stated that the identification plates are occasionally baked with the items

that contain curie quantities of tritium and the possibility of encountering removable surface contamination at the levels noted by SCLL is not uncommon. Allowable contamination levels in the areas where tritium is processed are 200 c/m on a smear taken over a 100 square centimeter area. Levels exceeding this amount are decontaminated with soap and water. Contamination levels in offices and areas where tritium is not processed are maintained at a non-detectable amount.

After the arrival of the Bendix employees, I reviewed the various allowable contamination levels established by the military and the Atomic Energy Commission for items containing tritium. These criteria are:

Source	Description of Item and Quantity of H3	Allowable H3 Loss in 100 ml H2O	Allowable H3 Removable by Smear 100 sq. cm.
10 CFR 32.40	Auto Locks 15 mci	3.2×10^{7}	2.2×10^{3} d/m
10 CFR 32.14	Watch dials 25 mci	2.8×10^{9}	Not required
10 CFR 32.101	Aircraft exit signs 4 ci	8.8×10^{9}	2.2×10^{3} d/m
Mil. Spec.	Luminous signs	1.1×10^{5}	1.1×10^{3} d/m

[redacted] and myself then reviewed the various methods used for tritium contamination detection. These methods can be grouped into one of three categories.

1. Smear survey, surface of item to be examined is rubbed with a filter paper. The amount of tritium removed from the surface of the part is determined by counting the smear with an internal proportional counter.
2. Water survey, part to be tested is immersed in 100 ml of distilled water for 24 hours at ambient temperature and pressure. A measured sample of water is evaporated and counted with an internal proportional counter.

3. Water survey, part is sampled as in two above. Determination of tritium in the water is made with a liquid scintillation counter.

The nonreproducibility of smear surveys was discussed. Reasons for the nonreproducibility are: variation in pressure applied while taking the smear, variation in the total area smeared, type of filter paper used, and the difficulties in determining the counting efficiency of the low energy betas from the tritium.

The second method of testing involves uncertainty in the percentage of the original tritium that is lost during the evaporation and problems in determining counting efficiency of the proportional counter for tritium.

The third method of determining tritium contamination does not have the disadvantages noted above. However, normally the equipment needed for the determination is only available at facilities where relatively large quantities of tritium are processed.

The consensus of the participants at the meeting was that all future contamination testing on the plate for acceptance purposes would utilize the liquid scintillation detection method.

[redacted] stated that the Bendix Scintilla contract would be terminated and Bendix Kansas City would initiate a purchase to obtain the plates remaining on the original Scintilla order. [redacted] reviewed the status of the original order as follows:

181 units shipped to Scintilla
125 units completed, ready for shipment except for leak test
90 units completed except for final coat
42 units ready for tritium application
62 units machined and engraved only

[redacted] stated that the order could be completed about 4 weeks after the stop order is removed.

The contamination data obtained with the liquid scintillation detection equipment was reviewed.

I stated that the tritium activity on a plate coated by the standard coat at U. S. Radium then sprayed with Laminar X-500 at SCLL on 5-4-65 was determined to be 3.5×10^8 d/m/100 ml. The determination was made on 5-28-65 by the water soak method utilizing the equipment at the Lawrence Radiation Laboratory Medical Department.

[redacted] stated that U. S. Radium had performed water immersion tests on two plates that were spray coated with Laminar X-500 over their standard cover coat, the plates were sprayed on 9-10-65. The water immersion test was performed on 1-5-66. Activity of 1.3×10^8 and 1.6×10^8 d/m of tritium per 100 ml of water was noted.

[redacted] also submitted data on tests of 2 plates coated with the standard U. S. Radium cover coat materials. The plates were processed on 9-10-65 and sampled on 1-5-66. The activity of tritium in the 100 ml of water was 1.5×10^8 and 1.2×10^8 d/m. On the small sample of water immersion results that are available, it appears that the additional spray coat of Laminar X-500 does not significantly reduce the leach loss of tritium to the water.

Data also was submitted by [redacted] and [redacted] on plates that were overcoated with the standard U. S. Radium covar coat and then dipped in Laminar X-500. Activity of 6.2×10^7 d/m, 8.1×10^7 d/m and 9.4×10^7 d/m was detected by [redacted] on 1-5-66 on plates that were dipped on 9-10-65.

Samples of water used to immerse plates coated on 5-4-65 were counted on 1-20-66 by [redacted] Medical Department with the following results, 9.1×10^7 d/m, 2.2×10^8 d/m, and 1.8×10^8 d/m. The surface activity detected by swiping the above plates on 11-3-65 was 4.6×10^2 d/m, 1.5×10^2 d/m and 1.2×10^2 d/m. The decrease in the counts observed by smear on 11-3-65 and the water soak test counted on 1-20-66 with the liquid scintillation equipment indicates the variation in the two methods of detection.

The consensus of those attending the meeting was that there was not sufficient information available to evaluate the effectiveness of the Laminar X-500 dip in reducing tritium activity detected by the water immersion test. The information presented by [redacted] based on a small sample size, however, seemed to indicate a reduction by a factor of 2 in tritium detected in the water immersion test. A summary of the water immersion data is presented in Table #1.

[redacted] stated the dip coated plates were unacceptable because of the ridge formed at the bottom of the plate. [redacted] felt that the AEC inspectors would not accept the plate. [redacted] also stated his objections to the dipped parts. He said that the ridge on the part produces an unsatisfactory appearance and exceeds the thickness spec of the plate. I stated that the SCLL engineers had advised me that the ridge formed on a dipped plate was not objectionable since close tolerances were not required on the plate. [redacted] stated he would have no objection to the dipped plate if the drawing was changed by the Sandia engineers to allow for the increased thickness of the ridge. He also suggested that several of the dipped plates be furnished to the AEC inspectors to demonstrate the appearance of the standard manufactured plate.

We next discussed a sampling criteria that would be used on the plate. It was proposed that the following drawing change be made. The drawing would state "the vendor to certify that the following contamination determinations have been performed."

(1) Contamination determinations shall be performed according to the following sample table.

Lot Size	No. of Samples to be Tested	Allowable No. of Rejects
0 - 20	1	0
0 - 40	2	0
0 - 60	3	0
0 - 80	4	0
0 - 100	5	0

(2) The contamination determination shall be performed six weeks, ± one week, after the final coat is applied to the plates.

(3) Each plate of the sample size shall be immersed in 100 ml of distilled water for 24 hours at ambient temperature and pressure. The activity of tritium in the water shall be measured by a liquid scintillation detector that has been calibrated for tritium efficiency with a National Bureau of Standards tritium standard. The maximum allowable activity of tritium in the water shall be less than 5.5×10^8 d/m.

I stated that the limit of 5.5×10^8 d/m per 100 ml of water should not be considered as the final contamination criteria. The criteria was proposed on the basis that it is less than the amount generally licensed by the AEC for tritium coated watch dials, and past testing indicates that the part as presently manufactured will meet this criteria. As testing of the parts proceeds, the data collected on the contamination levels observed during testing will be evaluated by SCLL and U. S. Radium Corp. and a final contamination criteria will be formulated.

[redacted]8215:[redacted]

Copy to:
[redacted] Dept. 841, Bendix Kansas City
[redacted] Dept. 247, Bendix Kansas City
[redacted] 8168
[redacted] 8168
File, 8215

[redacted]