



201 Washington Road
PO Box 5300
Princeton, NJ 08543
P 609.734.2000
F 609.734.2221
www.sarnoff.com

17 July 2009

J-6
MS-16

James P. Rust
Director, Facilities

Sarnoff Corporation
201 Washington Road
Princeton, NJ 08540
Tel. 609-734-3008
Fax. 609-720-4940
jrust@sarnoff.com

Dennis R. Lawyer
Health Physicist
Commercial and R&D Branch
Division of Nuclear Materials Safety
U.S. Nuclear Regulatory Commission, Region I
475 Allendale Road
King of Prussia, PA 19406-1415

SUBJECT: THE SARNOFF CORPORATION, SECOND REQUEST FOR
ADDITIONAL INFORMATION CONCERNING APPLICATION FOR AMENDMENT
TO LICENSE, CONTROL NO. 143652

NRC License Number: 29-28005-01 03029879

Dear Mr. Lawyer:

This is in response to your phone call and email of 6 July 2009 requesting further information related to our recent radioactive material license amendment request.

In addition to the information sent by fax to you on 16 July 2009, we herein supply the report of the contamination survey for tritium for room EN-310 (attached).

This should complete your requests for additional information and allow NRC to process our amendment application.

Very truly yours,
Sarnoff Corporation

James P. Rust
Director, Facilities

cc: Wesley R. Van Pelt, PhD, CIH, CHP, Radiation Safety Officer

Attachments:
Report of Tritium Survey EN-310 - July 2009



143652
NRC/RGNI MATEF..ALS-002

WESLEY R. VAN PELT ASSOCIATES, INCORPORATED

WESLEY R. VAN PELT, PH.D.
President
CERTIFIED HEALTH PHYSICIST
CERTIFIED INDUSTRIAL HYGIENIST
Consulting in Radiation Safety and Environmental Radioactivity

773 PARAMUS ROAD
PARAMUS, NEW JERSEY 07652
TEL 201-445-5124
CELL 201-446-3990
E-MAIL WESVANPELT@VERIZON.NET

16 July 2009



Mr. James Rust
Director of Facilities
Sarnoff Corporation
201 Washington Road
Princeton, NJ 08543-5300

Subject: **Report of Tritium Survey EN-310 - July 2009**

Dear Mr Rust:

I have completed a radiation contamination of the area in room EN-310 that had been used for research with tritium (H-3) in the past.

History

Tritium was used in room EN-310 from about 1995 to about 1998. The only use of tritium was to assay sealed vials of samples containing tritium on the Beckman liquid scintillation counter located in this room. The Beckman liquid scintillation counter is located to the right of the lab door in room EN-310 on a metal desk. The liquid scintillation counter was located at that spot during this time period and through to the present. Laboratory use of tritium stopped in 1998 and by July 2000 all tritium waste was shipped for disposal by a licensed radioactive waste contractor. The licensee has not received or used tritium since then. Since only sealed vials of samples for assay were taken into this room, contamination is not expected.

Contamination Survey

On 7 July 2009 I took a series of swipes (wipes) using 4.25 cm Whatman #1 filter paper circles. Using moderate pressure I wiped at least 200 cm² in each of eight locations on and around the liquid scintillation counter where contamination might have occurred. Appendix 1 shows the locations swiped.

Limits for Residual Radioactivity

Residual radioactivity screening values for surface contamination on buildings suitable for release for unrestricted use have been developed by NRC to demonstrate compliance with 20.1402, Radiological Criteria for Unrestricted Use. Appendix 2 gives these limits for several radionuclides. The screening limit for tritium is 120,000,000 dpm per 100 cm². Using an *a priori*

Report of Tritium Survey EN-310 - July 2009
for Sarnoff Corporation

Wesley R. Van Pelt Associates, Inc.
Page 2 of 7

ALARA goal of 10% of the screening limits, a working goal of 12,000,000 dpm per 100 cm² was established for this survey.

Results of Survey

The swipes were sent to Antkowiak and Mahoney Enterprises, Inc., East Earl, PA for analysis for tritium by liquid scintillation analysis using a dual dpm protocol. Swipes were analyzed in their laboratory in Orangeburg, NY. Appendix 3 shows the print-out of liquid scintillation dual dpm analysis and the lab batch sheet. Tritium dpm results are transcribed to Appendix 1 for ease of review. The highest swipe (#3) showed a gross analysis of 38.8 dpm. The background, represented by the blank swipe (#8), had an analysis value of 14.2. Therefore, the swipe with the highest result (#3) has a net activity of $(38.8 - 14.2) = 24.6$ dpm. Since at least 200 cm² of area was wiped with each swipe, this equates to $(24.6 / 2) = 12.3$ dpm/100cm² for swipe #8.

Therefore, the maximum swipe location had a surface contamination of 12.3 dpm/100cm². All other swipe locations had smaller surface contamination values. Thus, 12.3 dpm/100cm² is well below the ALARA screening goal of 12,000,000 dpm per 100 cm².

Discussion of Results and Conclusion

The surface swipes demonstrate that the surface contamination level is a factor of 1,000,000 below our ALARA screening goal, and a factor of 10,000,000 below the NRC screening limit. Therefore, the location may be released for unrestricted use.

Very truly yours,
WESLEY R. VAN PELT ASSOCIATES, Inc.

Wesley R. Van Pelt, Ph.D.
President

Report of Tritium Survey EN-310 - July 2009
for Sarnoff Corporation

Wesley R. Van Pelt Associates, Inc.
Page 3 of 7

Appendix 1
Swipe Locations in Room EN-310 and Analysis Results

| Swipe Number | Location | H-3 Analysis (dpm) |
|--------------|--|--------------------|
| 1 | Floor by door | 27.2 |
| 2 | Floor by liquid scintillation counter | 17.9 |
| 3 | Desk top by liquid scintillation counter | 38.8 |
| 4 | Liquid scintillation counter, cover top | 13.9 |
| 5 | Liquid scintillation counter, inside | 20.0 |
| 6 | Boxes of supplies under liquid scintillation counter | 21.8 |
| 7 | Liquid scintillation counter, control panel | 13.4 |
| 8 | Blank (clean filter paper) | 14.2 |
| 9 | Liquid scintillation counter, printer and CRT | 16.7 |

Report of Tritium Survey EN-310 - July 2009
for Sarnoff Corporation

Wesley R. Van Pelt Associates, Inc.
Page 4 of 7

Appendix 2
Surface Contamination Levels Suitable for Unrestricted Use

(Taken from NRC Regulatory Document Program-Specific Guidance About Academic, Research and Development, and Other Licenses of Limited Scope, NUREG-1556, Volume 7)

Table Q.3 Screening Values for Building Surface Contamination¹

| Radionuclide | Symbol | Screening levels for unrestricted release (dpm/100 cm ²) |
|----------------------|--------|--|
| Hydrogen-3 (Tritium) | H-3 | 1.2 x 10 ⁸ |
| Carbon-14 | C-14 | 3.7 x 10 ⁶ |
| Sodium-22 | Na-22 | 9.5 x 10 ³ |
| Sulfur-35 | S-35 | 1.3 x 10 ⁷ |
| Chlorine-36 | Cl-36 | 5.0 x 10 ⁵ |
| Manganese-54 | Mn-54 | 3.2 x 10 ⁴ |
| Iron-55 | Fe-55 | 4.5 x 10 ⁶ |
| Cobalt-60 | Co-60 | 7.1 x 10 ³ |
| Nickel-63 | Ni-63 | 1.8 x 10 ⁶ |
| Strontium-90 | Sr-90 | 8.7 x 10 ³ |
| Technetium-99 | Tc-99 | 1.3 x 10 ⁶ |
| Iodine-129 | I-129 | 3.5 x 10 ⁴ |
| Cesium-137 | Cs-137 | 2.8 x 10 ⁴ |
| Iridium-192 | Ir-192 | 7.4 x 10 ⁴ |

¹ Screening levels are based on the assumption that the fraction of removable surface contamination is equal to 0.1. For cases when the fraction of removable contamination is undetermined or higher than 0.1, users may assume, for screening purposes, that 100% of surface contamination is removable; and therefore the screening levels should be decreased by a factor of 10. Alternatively, users having site-specific data on the fraction of removable contamination (e.g., within 10% to 100% range) may calculate site-specific screening levels using DandD Version 1.

Table Q.3 does not include screening values for radionuclides that emit alpha particles, or for soil contamination. The NRC staff is assessing current screening approaches for sites with alpha emitters and for soil contamination. For such sites, licensees are encouraged to use, in the interim period, site-specific dose assessment based on actual

site physical and environmental conditions.

Units are disintegrations per minute per 100 square centimeters (dpm/100 cm²). 1 dpm is equivalent to 0.0167 becquerel (Bq). The screening values represent surface concentrations of individual radionuclides that would be deemed in compliance with the 0.25 mSv/yr (25 mrem/yr) unrestricted release dose limit in 10 CFR 20.1402. For radionuclides in a mixture, the "sum of fractions" rule applies; see 10 CFR Part 20, Appendix B, Note 4. Refer to NRC Draft Guidance DG-4006 for further information on application of the values in this table.

Table Q.3 was derived using the DandD screening code, Version 1, and its default input parameters. Table Q.3 provides criteria which permit licensees to demonstrate compliance with the unrestricted release dose criterion in the License Termination Rule. The values correspond to screening "derived concentration guidelines" for each specific radionuclide based on the methodology described in Draft Regulatory Guide DG-4006, "Demonstrating Compliance with the Radiological Criteria for License Termination," dated August 1998. Sites with building surface contamination levels below those listed in Table Q.3 would be deemed acceptable for release for unrestricted use in accordance with the dose criteria in 10CFR 20.1402, provided that residual radioactivity has been reduced to ALARA levels. The table is intended for use as criteria to facilitate license termination for many simple routine decommissioning cases without a site-specific dose assessment. For facilities with contamination levels above those in Table Q.3, additional site-specific dose assessments may be necessary, and licensees should refer to DG-4006 regarding acceptable methods for conducting the appropriate dose assessment.

The DandD code can be installed by downloading the self-extracting program file, setup.exe, accessed through the web site: <http://techconf.llnl.gov/radcri/java.html>.

DG-4006, NUREG - 1549, "Decision Methods for Dose Assessment to Comply With Radiological Criteria for License Termination," dated July 1998, and NUREG/CR - 5512, Vol. #3, "Residual Radioactive Contamination From Decommissioning, Parameter Analysis," dated April 25, 1996, can also be accessed through the above web site.

Report of Tritium Survey EN-310 - July 2009
for Sarnoff Corporation

Wesley R. Van Pelt Associates, Inc.
Page 6 of 7

Appendix 3
Liquid Scintillation Dual Dpm Analysis

PAGE: 1

USER: 1 ID:#82 SARNOFF PRESET TIME: 5.00 THU 16 JUL 2009 10:52
SAMPLE REPEAT: 1 CYCLE REPEAT: 1 SCR:N RS2S2:N
R#: 1 AGO:Y GOF:N RCM:Y
RCM-TIME: 3.10 INT:999.95
CHANNEL 1-LL: 0 UL: 400 2SIGMA: 2.00 BKG SUB: 0.00 BKG 2SIG: 0.00 LSR: 0
CHANNEL 2-LL: 400 UL: 670 2SIGMA: 2.00 BKG SUB: 0.00 BKG 2SIG: 0.00 LSR: 0
CHANNEL 3-LL: 670 UL: 1000 2SIGMA: 2.00 BKG SUB: 0.00 BKG 2SIG: 0.00 LSR: 0

DUAL LABEL DPM, SET UP ON TUE 17 MAR 2009 11:52
UNKNOWN ID:NONE UNKNOWN REPLICATES: 1
UNKNOWN NORM FACTOR IS01:Q 1.00000 IS02:Q 1.00000
UNKNOWN UNITS IS01:DPM IS02:DPM
CALCULATE COEFF:N HALF LIFE(DAYS) IS01:N IS02:N
QUENCH COEFF IS01, CH1 A: 3.917491 B:-0.0038821 C:-0.0000152 D:-0.0000000202
IS01, CH2 A: -0.2154782 B:-0.0026292 C:0.00003992 D:-0.0000000914
IS02, CH1 A: 2.915836 B:0.00011871 C:-0.0000028 D:-0.000000247
IS02, CH2 A: 4.344370 B:-0.0005159 C:0.00000054 D:-0.0000000092
QUENCH LIMITS LOW:1.333 HIGH:151.0

| SAM | POS | IS01 DPM | 2SIG1 | IS02 DPM | 2SIG2 | CPM3 | 2SIG3 | AVG H# | ERR |
|-----|-------|----------|-------|------------|-------|------------|-------|--------|-----|
| 1 | 24- 1 | 27.22513 | 29.17 | 14.37778 | 27.47 | 10.60 | 27.47 | 115.0 | |
| 2 | 24- 2 | 17.97935 | 37.14 | 12.19592 | 30.15 | 7.20 | 33.33 | 138.0 | |
| 3 | 24- 3 | 38.84734 | 27.22 | 15.00444 | 28.97 | 8.60 | 30.50 | 135.0 | |
| 4 | 24- 4 | 13.93902 | 37.14 | 12.86579 | 29.17 | 9.00 | 29.81 | 115.0 | |
| 5 | 24- 5 | 19.95995 | 32.03 | 11.56710 | 30.50 | 7.20 | 33.33 | 109.0 | |
| 6 | 24- 6 | 21.82137 | 32.03 | 13.05608 | 28.87 | 11.40 | 26.49 | 115.0 | |
| 7 | 24- 7 | 13.40728 | 35.36 | 13.81125 | 29.01 | 8.50 | 30.50 | 97.0 | |
| 8 | 24- 8 | 14.18920 | 34.30 | 12.33432 | 29.43 | 8.40 | 30.16 | 84.0 | |
| 9 | 24- 9 | 18.87653 | 34.30 | 13.04616 | 28.87 | 9.40 | 29.17 | 108.0 | |
| 10 | 24-10 | XXXXXXXX | XXXXX | XXXXXXXXXX | XXXXX | XXXXXXXXXX | XXXXX | XXXXXX | 101 |
| 11 | 24-11 | XXXXXXXX | XXXXX | XXXXXXXXXX | XXXXX | XXXXXXXXXX | XXXXX | XXXXXX | 101 |
| 12 | 24-12 | XXXXXXXX | XXXXX | XXXXXXXXXX | XXXXX | XXXXXXXXXX | XXXXX | XXXXXX | 101 |
| 13 | 24-13 | XXXXXXXX | XXXXX | XXXXXXXXXX | XXXXX | XXXXXXXXXX | XXXXX | XXXXXX | 101 |
| 14 | 24-14 | XXXXXXXX | XXXXX | XXXXXXXXXX | XXXXX | XXXXXXXXXX | XXXXX | XXXXXX | 101 |
| 15 | 24-15 | XXXXXXXX | XXXXX | XXXXXXXXXX | XXXXX | XXXXXXXXXX | XXXXX | XXXXXX | 101 |
| 16 | 24-16 | XXXXXXXX | XXXXX | XXXXXXXXXX | XXXXX | XXXXXXXXXX | XXXXX | XXXXXX | 101 |
| 17 | 24-17 | XXXXXXXX | XXXXX | XXXXXXXXXX | XXXXX | XXXXXXXXXX | XXXXX | XXXXXX | 101 |

CALIBRATION SUCCESSFUL THU 16 JUL 2009 11:50

