TELEDYNE
REYNOLDS
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June 5, 2013
Certified Mail No.: 7005 1160 0003 0244 9226

Mr. Richard K. Struckmeyer, Health Physicist
Licensing Branch
Division of Materials Safety and State Agreements
Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Teledyne Reynolds, Inc. Radioactive Material License Number 04-16982-01E
Mail Control No. 579568

Dear Mr. Struckmeyer:

This is in response to your *Request for Additional Information* letter regarding the renewal of Teledyne Reynolds, Inc. exempt-distribution License No. 04-16982-01E. Please find the Teledyne Reynolds, Inc. response to your questions below.

1) Title 10, Code of Federal Regulations, Section 32.14(a) requires the applicant to satisfy the general requirements specified in § 30.33 of this chapter. This regulation in essence requires you to apply for and obtain a specific license authorizing possession and use of radioactive material from the State of California. The most recent possession and use license in our files indicates an expiration date of May 19, 2013. Please provide a copy of the license with a later expiration date, or evidence that you have applied for such license.

A. **Attachment A** is a copy of page 1, of the State of California Radioactive Material License No. 2997-42, with an expiration date of May 19, 2013. **Attachment B** is a copy of Teledyne Reynolds, Inc., cover letter to the California Department of Public Health (CDPH), dated March, 21, 2013, which is part of the Renewal Application. **Attachment C** is a copy of the Notice of Receipt of Renewal Application for Review, by the CDPH, dated March 25, 2013. The renewal package is well beyond the minimum 30-day notice required for submission for renewal.

2) Title 10, Code of Federal Regulations, Section 32.14(b)(1) requires that the applicant submit information regarding the maximum quantity of byproduct material in each product. Please provide the maximum quantity of byproduct material in each product.

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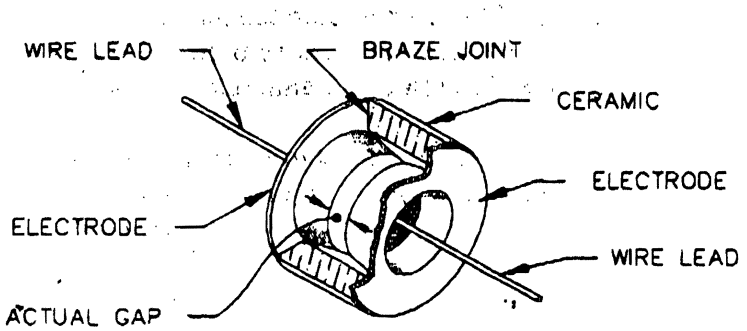
A. The physical size of the electron tubes (product) varies. Typical external dimensions range from 3/16 in. outer diameter X 3/16 in. long, to ¾ in. outer diameter X 9/16 in. long. The maximum quantity of byproduct material Tritium (H-3) gas in each product is:

DCF - .500 in. diameter – 5.50E-06 uCi/unit
DKF - .750 in. diameter – 8.95E-06 uCi/unit
MCH - .186 in. diameter – 8.10E-08 uCi/unit
MCF - .186 in. diameter – 2.10E-07 uCi/unit
MLH - .312 in. diameter – 8.40E-07 uCi/unit
MLF - .312 in. diameter – 1.80E-07 uCi/unit
MLT - .312 in. diameter – 1.45E-06 uCi/unit

3) Title 10, Code of Federal Regulations, Section 32.14(b)(2) requires details of construction and design of each product. Please provide details of construction and design of each product.

A. The electron tubes go through a high-temperature vacuum hermetic sealing process. During the high-temperature process a permanent hermetic seal binds the radioactive byproduct and components together. The physical size of electron tubes (product) varies. Typical external dimensions range from 3/16 in. outer diameter X 3/16 in. long, to ¾ in. outer diameter X 9/16 in. long. The basic construction of the product is a ceramic alumina tube with both ends of the tube metallized for binding. A thin copper silver (cusil) washer is placed between the ceramic tube and a copper electrode, which is used to help form the braze joint. The basic design below is the same for all product:



4) Title 10, Code of Federal Regulations, Section 32.14(b)(3) requires that the method of containment or binding of the radioactive byproduct material in the product be described. Please provide the method of containment or binding of the radioactive byproduct material in the product.

A. A high-temperature hermetic seal process is the method of containment or binding of the radioactive byproduct material in the product. The following process is described:

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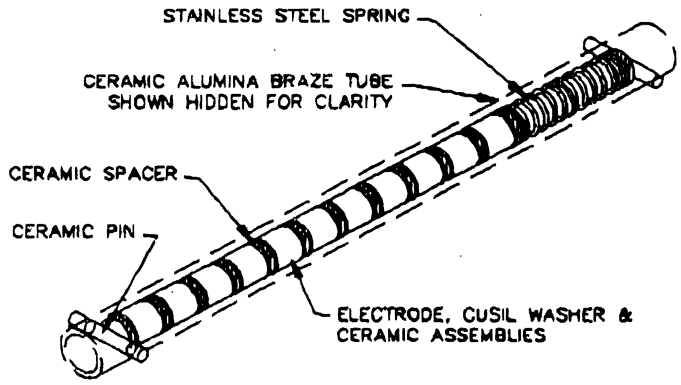
The hand-assembled units are stacked vertically inside ceramic alumina braze tube fixtures, whose internal diameter is barely big enough to accept the cylinder-shaped units. See the diagram below. The units are stacked one on top of another until the braze tube is "full." Once braze tubes are full a compression spring is held in place by a ceramic retaining pin.



Several full ceramic braze tubes are placed inside of an Inconel steel retort whose maximum internal diameter may be 3 ¼ inches. The loaded steel retort is inside of the radiation safety enclosure to prepare for the vacuum process. See License Renewal submission, attached to NRC Form 313, **Attachment A**, page 4, Photo 1.

End caps seal both ends of the steel retort, with one end attached to the vacuum system, prior to the vacuum process. A vacuum is pulled on the loaded retort while the retort is still at ambient temperature. Once the desired vacuum is reached, the authorized operator supplies the desired quantity of Tritium H-3 gas to the loaded retort using the needle vernier valve, located on the outside control panel. See License Renewal submission, attached to NRC Form 313, **Attachment A**, page 4, Photo 6.

Once the vacuumed retort has been loaded with Tritium H-3, and the main gas of nitrogen or argon is admitted to a pressurized pressure, the retort is placed inside of the counter-top oven, to go through the braze cycle. See License Renewal submission, attached to NRC Form 313, **Attachment A**, page 4, Photo 1. The loaded retort is processed through a proprietary temperature cycle that will cause the copper/silver (cusil) washer to fuse the copper electrode to the metalized ceramic tube, forming a permanent hermetic seal. This binds the Tritium H-3 gas to the product.

After completion of the braze cycle, the retort is removed from the oven and allowed to cool to ambient temperature under the radiation safety enclosure. Once the loaded retort is at ambient, while the retort is still under vacuum, the remaining Tritium gas from the load is vented to the outside of the building through the vent stack.

5) Title 10, Code of Federal Regulations, Section 32.14(b)(6) requires a description of the proposed method of labeling or marking each unit and its container with the identification of the manufacturer or initial transferor and the byproduct material in the product. Please describe the proposed method of labeling or marking each unit and its container with the identification of the manufacturer or initial transferor and the byproduct material in the product.

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A. In accordance with our License Renewal submission, attached to NRC Form 313, **Attachment A**, page 15, paragraph **10.7 Marking**, "Each electron tube, containing Tritium (H-3), shall be identified on its external surface with the radioactive isotope symbol H-3, the manufacturer's part number, and the manufacturer's identifying symbol, prior to shipment. If the device is too small to be physically identified, the aforementioned information will be marked on the polyethylene bag containing the devices. Any electron tube, who's outside diameter is less than or equal to .191 in., and overall length is less than or equal to .083 in., will have the identification information marked on the polyethylene bag."

6) Title 10, Code of Federal Regulations, Section 32.14(b)(7) requires that the radiation level and the material of measurement for products for which limits on levels of radiation are specified in § 30.15; 10 CFR 30.15(a)(8) specifies such limits for electron tubes. Please provide this information.

A. In accordance with Title 10, Code of Federal Regulations, Section 32.14(b)(7) and§ 30.15; 10 CFR 30.15(a)(8), requires that the radiation level and the material of measurement for products for which limits on levels of radiation are specified, except for:

Electron tubes: *Provided*, that each tube does not contain more than one of the following specified quantities of byproduct material: (i) 150 millicuries of tritium per microwave receiver protector tube or 10 millicuries of tritium per any other electron tube.

Each electron tube contains less than 10 microcuries of Hydrogen-3. See number 2 above.

7) Title 10, Code of Federal Regulations, Section 32.14(c) requires that each product will contain no more than the quantity of byproduct material specified for that product in § 30.15, and that the levels of radiation from each product containing byproduct material will not exceed the limits specified for that product in § 30.15 CFR 30.15(a)(8) specifies such limits for electron tubes. Please provide information showing how you will meet this requirement.

A. A high-temperature hermetic seal process is the method of containment or binding of the radioactive byproduct material in the product. The following process is performed by authorized personnel only:

An engineering-released documented operating procedure is used for the brazing, or binding procedure of the product. An engineering design data sheet is also created that indicates which product contains radioactive byproduct material. The data sheet includes the individual components to be used on the product; the gas, or radioactive byproduct material; furnace temperatures and the designed pressure Torr.

Prior to introducing any radioactive byproduct material into the vacuum lines for manufacture of the product, the mechanical valve located on the radioactive gas cylinder and a mechanical vernier control valve, identified as Tritium and located approximately six inches from the radioactive gas cylinder valve, are in the close position. See page 9 and 10 of the License Renewal submission, attached to NRC Form 313, dated 11-6-12.

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Page 9, Photo 6, shows the Tritium vernier control valve on the upper left corner of the manifold control panel. A digital pressure readout unit, which indicates pressure Torr, is shown in red, on the right-side panel. Page 10, Photo 7, shows a green gas cylinder, which contains the radioactive byproduct, on the top right corner, inside the radiation safety enclosure.

Authorized personnel open the radioactive gas cylinder valve briefly for a couple of seconds, from inside of the radioactive safety enclosure (See page 10, photo 7, of the renewal submittal), and then close the cylinder valve. The 6-inch copper tube between the cylinder and the Tritium vernier control valve is now charged with radioactive byproduct material. The personnel review the engineering data sheet for the designed pressure Torr and slowly open the mechanical vernier valve, located on the outside of the radiation safety enclosure (See page 9, photo 6, of the renewal submittal). The personnel reads the digital pressure readout unit and closes the vernier valve once the pressure Torr indicates the engineering designed value for the product being manufactured. The product is now charged with radioactive byproduct material.

After the product has completed the binding/brazing process the product is tested electronically, to ensure the desired results. Any product that demonstrates an undesired electronic result is considered defective. It is identified as scrap, removed from the rest of the manufacturing process and is placed in the radioactive waste container.

8) Title 10, Code of Federal Regulations, Section 32.14(d) requires that the byproduct material is properly contained in the product under the most severe conditions that are likely to be encountered in normal use and handling. Please describe how the byproduct material is properly contained in the product under the most severe conditions that are likely to be encountered in normal use and handling.

A) The electron tubes go through a high-temperature vacuum hermetic sealing process. During the high-temperature process a permanent hermetic seal binds the radioactive byproduct and components together. The unit permanently contains the byproduct under the most severe conditions that are likely to be encountered in normal use and handling. Any electron tube that is identified as defective is identified as scrap during manufacture, removed from further production, and placed in the radioactive waste container.

9) Title 10, Code of Federal Regulations, Section 32.15(b) requires that no person licensed under § 32.14 shall transfer to other persons for use under § 30.15 of this chapter or equivalent regulations of an Agreement State any defective part or product. Please describe how you shall prevent transfer to other persons for use under § 30.15 of this chapter or equivalent regulations of an Agreement State any defective part or product.

A) The electron tubes go through a high-temperature vacuum hermetic sealing process. During the high-temperature process a permanent hermetic seal binds the radioactive byproduct and components together. Any electron tube that is identified as defective is identified as scrap during manufacture, removed from further production, and placed in the radioactive waste container.

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10) Title 10, Code of Federal Regulations, Section 32.15(d)(1) requires each unit and its container to be labeled or marked (except timepieces or hands or dials containing tritium or promethium-147) so that the manufacturer or initial transferor of the product and the byproduct material in the product can be identified. Please describe and provide copies of such labels.

A. See question 5 above and sample copy.

251-1047-000
1322 H3

Should you have any questions regarding this matter, please contact the undersigned at telephone number (805) 928-5866, extension 13, FAX (805) 922-3601, or e-mail: dcadena@teledyne.com.

Sincerely,

Daniel A. Cadena, Jr.
Radiation Safety Officer
ELECTRONIC PRODUCTS GROUP
Teledyne Reynolds, Inc.
3070 Skyway Drive
Santa Maria, CA 93455-1116

cc: Haick Issaian, Health Physics Consultant

Attachments:

ELECTRONICS PRODUCTS DIVISON
3070 SKYWAY DRIVE, BLDG. #301 • SANTA MARIA, CALIFORNIA 93455-1116 • (805) 928-5866 • FAX (805) 922-3601

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RADIOACTIVE MATERIAL LICENSE

Pursuant to the California Code of Regulations, Division 1, Title 17, Chapter 5, Subchapter 4, Group 2, Licensing of Radioactive Material, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, use, possess, transfer, or dispose of radioactive material listed below; and to use such radioactive material for the purpose(s) and at the places(s) designated below. This license is subject to all applicable rules, regulations, and orders of the California Department of Public Health now or hereafter in effect and to any standard or specific condition specified in this license.

1 Licensee:	Teledyne Corporation dba Teledyne Reynolds, Inc.	3. License Number: 2997-42	Amendment Number: 24
2 Address:	3070 Skyway Drive, Suite 301 Santa Maria, CA 93455	4. Expiration date: May 19, 2013	(5)
Attention:	Daniel A. Cadena, Jr. Radiation Safety Officer	5. Inspection agency:	Radiologic Health Branch South

In response to the letter dated April 24, 2012, signed by Daniel A. Cadena, Jr., Radiation Safety Officer, License Number 2997-42 is hereby amended as follows:

6. Nuclide	7. Form	8. Possession Limit
A. Hydrogen-3	A. Gas	A. Not to exceed 50 curies.

9. Authorized Use

A. To be used to fill electron tubes for purposes of stabilizing breakdown and incidental to manufacture of electron tubes.

LICENSE CONDITIONS

10. Radioactive materials may be used only at the following locations:

(a) 3070 Skyway Drive, Suite 301, Santa Maria, CA.

(b) 3070 Skyway Drive, Suite 302, Santa Maria, CA.

11. This license is subject to an annual fee for sources of radioactive material authorized to be possessed at any one time as specified in Items 6, 7, 8 and 9 of this license. The annual fee for this license is required by and computed in accordance with Title 17, California Code of Regulations, Sections 30230-30232 and is also subject to an annual cost-of-living adjustment pursuant to Section 100425 of the California Health and Safety Code.

12. Radioactive material described in this license shall be used by, or under the supervision of, the following individuals:

a) Daniel A. Cadena, Jr.
b) Vicente Galam
c) Jim McCoskey
d) Earl Morales
e) Silvia Robles
f) Nicholas Rock

Attachment A

13. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 6, 7, 8 and 9 of this license in accordance with the statements, representations, and procedures contained in the documents listed below. The Department's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

TELEDYNE REYNOLDS, INC.
A Teledyne Technologies Company

March 21, 2013

California Department of Public Health
Radiological Health Branch, MS 7610
PO Box 997414
Sacramento, CA 95899-7414

Subj: Renewal of License No. 2997-42

Dear Sir:

Enclosed is the Radioactive Material License Application, RH 2050, for Radioactive Material License No. 2997-42, for Teledyne Reynolds, Inc.

Attachment A is the included addendum to the license form. Statements of Training and Experience, RH 2050A, are enclosed.

Should you have any questions regarding this matter, please contact the undersigned at telephone number (805) 928-5866, extension 13, FAX (805) 922-3601, or e-mail: dcadena@teledyne.com.

Sincerely,

Daniel A. Cadena, Jr.
Radiation Safety Officer
ELECTRONIC PRODUCTS GROUP

cc: Haiack Issaian

Attachment B

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State of California—Health and Human Services Agency
California Department of Public Health

RON CHAPMAN, MD, MPH
Director & State Health Officer

EDMUND G. BROWN, JR.
Governor

March 25, 2013

Teledyne Corporation dba Teledyne Reynolds, Inc.
Daniel A. Cadena, Jr., Radiation Safety Officer
3070 Skyway Drive, Unit 301
Santa Maria, CA 93455

NOTICE OF RECEIPT OF RENEWAL APPLICATION FOR REVIEW

Docket Number: 032513-2997
License Number: 2997-42
Application Date: 03/21/13

The above referenced renewal application has been received by the Radiologic Health Branch. Since your application is deemed timely, the license will not expire until final action has been taken by the Department. This application will be processed in the order received. The license expiration date (*item 4* on the face of the license) will not change until the renewal is reviewed and approved by the Department.

Please retain this notice to demonstrate proof of an active license.

If your renewal application contains any program changes requiring immediate action, e.g. change of Radiation Safety Officer, change of storage/use location, change in possession limit, **please submit a separate amendment request,** and reference the license number.

Any additional correspondence regarding your renewal application **must be submitted in duplicate** and should reference the assigned docket number above.

Thank you,

Stephen Hsu
Supervising Health Physicist
Radioactive Materials Licensing Section

Attachment C

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