

**EXPORT LICENSE**

NRC FORM 2 0  
(1-1)

**NRC LICENSE NO.:** PXB178.02

Page 1 of 3

**NRC DOCKET NO.:** 11006117

**LICENSE EXPIRES:** February 28, 2022



**United States of America**  
Nuclear Regulatory Commission  
Washington, D.C. 20555

Pursuant to the Atomic Energy Act of 1954, as amended, and the regulations issued by the Nuclear Regulatory Commission (NRC) pursuant thereto, and in reliance on statements and representations heretofore made by the applicant/licensee, this license is hereby issued authorizing the licensee to export of the byproduct materials listed below, subject to the terms and conditions herein. This license is only valid if the licensee or 'Other Party (ies) to Export' maintain the requisite NRC or Agreement State domestic license(s).

|  |   |
|--|---|
| <p align="center"><b>LICENSEE</b></p> <p>JL Shepherd and Associates<br/>1010 Arroyo Ave.<br/>San Fernando, CA 91340</p> <p>Attn: Mary Shepherd</p> | <p align="center"><b>ULTIMATE CONSIGNEE(S) IN FOREIGN COUNTRY(IES)</b></p> <p align="center">None</p>   |
| <p align="center"><b>INTERMEDIATE CONSIGNEE(S) IN FOREIGN COUNTRY(IES)</b></p> <p align="center">None</p>  | <p align="center"><b>OTHER U.S. PARTY(IES) TO EXPORT</b></p> <p>Edlow International Company<br/>1666 Connecticut Avenue., N.W., Suite 201<br/>Washington, DC 20009</p> <p>(export broker)</p> |
| <p><b>APPLICANT'S REFERENCE:</b> Application Dated 11-16-18</p>  | <p><b>ULTIMATE DESTINATIONS:</b> See following page</p>   |

**DESCRIPTION OF 10 CFR PART 110, APPENDIX P, BYPRODUCT MATERIALS  
TO BE EXPORTED, INCLUDING CONDITIONS AND NOTES**  
(NOTE: SEE PAGE 3 FOR DEFINITIONS OF CATEGORY 1 AND CATEGORY 2)

Export to Argentina, Austria, Australia, Brazil, Belgium, Canada, Chile, China, Germany, Greece, Guatemala, Malaysia, Netherlands, Panama, Peru, Singapore, South Africa, South Korea, Sri Lanka, Taiwan, Turkey and the United Kingdom of Category 1 and Category 2 quantities of Co-60 for high dose radiation, is authorized. See conditions on page 2.

Export to Mexico, Saudi Arabia, Spain, and Sweden of Category 2 quantities of Cs-137 for biological irradiation, is authorized.

Licensee is responsible for compliance with all applicable export, and other domestic regulatory requirements, including all terms and conditions of domestic material possession licenses. Licensee, if not already submitted with your application, must submit information required by 10 CFR 110.32(d) and pertinent documentation required by 10 CFR 110.32(g) at least 24 hours prior to shipment. See Page 2 for Mandatory Pre-shipment Notifications.

This license replaces PXB178.01 and amends its authority by: 1) changing the licensee point of contact; 2) adding one "Other U.S. Party(ies) to Export"; and 3) extending the expiration date from December 31, 2018 to February 28, 2022.

|   |  |
|---|--|
| <p>Neither this license nor any right under this license shall be assigned or otherwise transferred in violation of the provisions of the Atomic Energy Act of 1954, as amended.</p> <p>This license is subject to the right of recapture or control by Section 108 of the Atomic Energy Act of 1954, as amended, and to all the other provisions of said Acts, now or hereafter in effect and to all valid rules and regulations of the Nuclear Regulatory Commission.</p> | <p align="center"><b>THIS LICENSE IS INVALID UNLESS SIGNED BELOW<br/>BY AUTHORIZED NRC REPRESENTATIVE</b></p> <p>NAME AND TITLE: _____<br/><b>David L. Skeen, Deputy Director<br/>Office of International Programs</b></p> <p>DATE OF ISSUANCE: _____<br/><b>February 12, 2019</b></p> |
|---|--|

**EXPORT LICENSE**

**DESCRIPTION OF 10 CFR PART 110, APPENDIX P, BYPRODUCT MATERIALS  
TO BE EXPORTED, INCLUDING CONDITIONS AND NOTES**

**PXB178.02**  
Page 2 of 3

The licensee is prohibited from shipping Category 1 quantities of Co-60 to Argentina, Austria, Australia, Brazil, Belgium, Canada, Chile, China, Germany, Greece, Guatemala, Malaysia, Netherlands, Panama, Peru, Singapore, South Africa, South Korea, Sri Lanka, Taiwan, Turkey, and the United Kingdom, until:

- [1] The licensee has requested in writing from the U.S. Nuclear Regulatory Commission (NRC) to obtain specific consent from the importing country's regulatory authority,
- [2] NRC has received and considered government-to-government consent pursuant to 10 CFR §110.42(e)(3); and
- [3] NRC has informed the licensee in writing, that it is authorized to ship the materials to the ultimate consignee specified.

**ULTIMATE DESTINATION(S):**

Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Germany, Greece, Guatemala, South Korea, Malaysia, Mexico, Netherlands, Panama, Peru, Saudi Arabia, Singapore, South Africa, Spain, Sri Lanka, Sweden, Taiwan, Turkey and United Kingdom.

**MANDATORY ADVANCED NOTIFICATIONS PER 10 CFR PART 110.50(c)**

The following Advanced Notifications must be made to both the NRC and, in case of exports, the government of the importing country in advance of each shipment:

Mandatory Advanced Notifications to the NRC are to be emailed to [hoo.hoc@nrc.gov](mailto:hoo.hoc@nrc.gov) (preferred method) or faxed to the NRC at 301-816-5151. In the subject line of the email or on the fax cover page include: "10 CFR 110.50(c) Notification." For technical assistance, use the same e-mail address or call 301-287-9056.

Mandatory Advanced Notifications to the government of the importing country must be emailed or faxed to the appropriate foreign government authorities. To locate the point-of-contact for international Advanced Notifications see: <http://www-ns.iaea.org/downloads/rw/imp-export/import-export-contact-points.pdf>. In the subject line of the email or on the fax cover page include: "NOTIFICATION TO THE IMPORTING STATE PRIOR TO SHIPMENT OF CATEGORY 1 OR 2 RADIOACTIVE SOURCES." For technical assistance or for countries not listed, contact the Office of International Programs' export/import staff at 301-287-9056.

**Table 1: Appendix P to Part 110 Category 1 and Category 2 Radioactive Material Threshold Limits**

| Radioactive Material                             | Category 1          |                          | Category 2          |                          |
|--|---------------------|--------------------------|---------------------|--------------------------|
|  | Terabequerels (TBq) | Curies (Ci) <sup>1</sup> | Terabequerels (TBq) | Curies (Ci) <sup>1</sup> |
| Americium-241 (Am-241)                           | 60                  | 1,600                    | 0.6                 | 16                       |
| Americium-241/Beryllium (Am-241/Be)              | 60                  | 1,600                    | 0.6                 | 16                       |
| Californium-252 (Cf-252)                         | 20                  | 540                      | 0.2                 | 5.4                      |
| Curium-244 (Cm-244)                              | 50                  | 1,400                    | 0.5                 | 14                       |
| Cobalt-60 (Co-60)                                | 30                  | 810                      | 0.3                 | 8.1                      |
| Cesium-137 (Cs-137)                              | 100                 | 2,700                    | 1.0                 | 27                       |
| Gadolinium-153 (Gd-153)                          | 1,000               | 27,000                   | 10.0                | 270                      |
| Iridium-192 (Ir-192)                             | 80                  | 2,200                    | 0.8                 | 22                       |
| Plutonium-238 <sup>2</sup> (Pu-238)              | 60                  | 1,600                    | 0.6                 | 16                       |
| Plutonium-239/Beryllium <sup>2</sup> (Pu-239/Be) | 60                  | 1,600                    | 0.6                 | 16                       |
| Promethium-147 (Pm-147)                          | 40,000              | 1,100,000                | 400                 | 11,000                   |
| Radium-226 <sup>3</sup> (Ra-226)                 | 40                  | 1,100                    | 0.4                 | 11                       |
| Selenium-75 (Se-75)                              | 200                 | 5,400                    | 2.0                 | 54                       |
| Strontium-90 (Y-90)                              | 1,000               | 27,000                   | 10.0                | 270                      |
| Thulium-170 (Tm-170)                             | 20,000              | 540,000                  | 200                 | 5,400                    |
| Ytterbium-169 (Yb-169)                           | 300                 | 8,100                    | 3.0                 | 81                       |

**Calculation of Shipments Containing Multiple Sources or Radionuclides:**

The "sum of fractions" methodology for evaluating combinations of radionuclides being transported is to be used when import or export shipments contain multiple sources or multiple radionuclides. The threshold limit values used in a sum of the fractions calculation must be the metric values (i.e., TBq).

I. If multiple sources and/or multiple radionuclides are present in an import or export shipment, the sum of the fractions of the activity of each radionuclide must be determined to verify the shipment is less than the Category 1 or 2 limits of Table 1, as appropriate. If the calculated sum of the fractions ratio, using the following equation, is greater than or equal to 1.0, then the import or export shipment exceeds the threshold limits of Table 1 and the applicable security provisions of this part apply.

II. Use the equation below to calculate the sum of the fractions ratio by inserting the actual activity of the applicable radionuclides or of the individual sources (of the same radionuclides) in the numerator of the equation and the corresponding threshold activity limit from the Table 1 in the denominator of the equation. Ensure the numerator and denominator values are in the same units and all calculations must be performed using the TBq (i.e., metric) values of Table 1.

- R1 = activity for radionuclides or source number 1      AR1 = activity limit for radionuclides or source number 1
- R2 = activity for radionuclides or source number 2      AR2 = activity limit for radionuclides or source number 2
- Rn = activity for radionuclides or source number n      ARn = activity limit for radionuclides or source number n

$$\sum_1^n \left[ \frac{R_1}{AR_1} + \frac{R_2}{AR_2} + \frac{R_n}{AR_n} \right] \geq 1$$

<sup>1</sup> The values to be used to determine whether a license is required are given in TBq. Curie (Ci) values are provided for practical usefulness only and are rounded after conversion.

<sup>2</sup> The limits for exports of Pu-238 and Pu-239/Be can be found in § 110.21.

<sup>3</sup> Discrete sources of Radium-226.