

**EXPORT LICENSE**

NRC FORM 250P (4/10)



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

**NRC LICENSE NO.: PXB15a.03**

**LICENSE EXPIRES: November 30, 2020**

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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 the byproduct materials listed below, subject to the terms and conditions herein. This license is only valid if the licensee maintains the requisite NRC or Agreement State domestic licenses.

<p align="center"><b>LICENSEE</b></p> <p>PathFinder Energy Services, LLC.                  ATTN: Andrew Neil                  23500 Colonial Parkway                  Katy, TX 77493</p> <p>APPLICANT'S REFERENCE: PL081</p>	<p align="center"><b>ULTIMATE FOREIGN CONSIGNEE(S)</b></p> <p align="center">Listed on Page 3</p> <p align="center">(Foreign Affiliates)</p>
<p align="center"><b>INTERMEDIATE FOREIGN AND/OR DOMESTIC CONSIGNEE(S)</b></p> <p align="center">NONE</p>	<p align="center"><b>OTHER PARTY(IES) TO EXPORT</b></p> <p align="center">NONE</p>

**COUNTRY(IES) OF ULTIMATE DESTINATION:** Argentina, Australia, Austria, Belarus, Belgium, Brazil, Bulgaria, Canada, China, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Kazakhstan, Kuwait, Latvia, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Qatar, Romania, Russia, Singapore, Slovak Republic, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Thailand, Turkey, Ukraine, United Arab Emirates and United Kingdom.

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

Export to countries listed as 'Country(ies) of Ultimate Destination' and 'Ultimate Foreign Consignee(s)' listed on Page 3, of quantities of Am-241/Be, Cf-252, and Cs-137, contained in sealed sources for use in oil and gas well logging operations, is authorized. When combined for shipping, these sources may aggregate to a Category 2 quantity.

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.

Licensee shall submit by February 1 of each year one copy of a report of all americium shipments (under this license or under a general license) during the previous calendar year as required by 10 CFR §110.54(b). The report must include: (1) A description of the material, including quantity; (2) Approximate shipment dates; and (3) A list of recipient countries, end users, and intended use keyed to the items shipped.

Expiration date is based on established limits. This license replaces PCB15a.02 and amends its authority by: 1) revising contact information for the licensee; 2) revising list of 'Ultimate Foreign Consignee(s)'; 3) revising conditions; 4) incorporating the new license number format; 5) revising the list of 'Country(ies) of Ultimate Destination'; 6) extending the expiration date from February 29, 2016 until November 30, 2020; and 7) reissuing as a specific export only license.

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.

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 of the other provisions of said Acts, now or hereafter in effect and to all valid rules and regulations of the NRC.

THIS LICENSE IS INVALID UNLESS SIGNED BELOW  
 BY AUTHORIZED NRC REPRESENTATIVE

NAME AND TITLE:

*Stephén Dembek*  
 Stephén Dembek, Acting Deputy Director  
 Office of International Programs

DATE OF ISSUANCE: \_\_\_\_\_

November 19, 2010

**MANDATORY PRE-SHIPMENT NOTIFICATIONS PER 10 CFR PART 110.50(b)(4)**

The following Prior Shipment Notifications must be made to both the NRC and the government of the importing country in advance of each shipment:

Prior Shipment 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(b)(4) Notification." For technical assistance, use the same e-mail address or call 301-816-5100.

Prior Shipment 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 Prior Shipment 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 301-415-2344.

**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 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 export shipment, the sum of the fractions of the activity of each radionuclides 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 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.

