

EXPORT LICENSE

NRC FORM 250
(10-07)UNITED STATES OF AMERICA
Nuclear Regulatory Commission
Washington, D.C. 20555

NRC LICENSE NO.: PXB216.00

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NRC DOCKET NO.: 11006285

LICENSE EXPIRES: January 31, 2019

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 or 'Other Party(ies) to Export' maintain the requisite NRC or Agreement State domestic license(s).

LICENSEE

Halliburton Energy Services
3000 N. Sam Houston Parkway E.
Houston, Texas 77032

Attn: Bertha Rodriguez

ULTIMATE CONSIGNEE(S) IN FOREIGN COUNTRY(IES)

See 'Country(ies) of Ultimate Destination' on page 2

INTERMEDIATE CONSIGNEE(S) IN FOREIGN COUNTRY(IES)

None

OTHER U.S. PARTY(IES) TO EXPORT

Halliburton Energy Services, Inc.
14851 Milner Road
Gate 5 A-Dock SR-1/SR-2
Houston, Texas 77032

(supplier/receiving)

APPLICANT'S REFERENCE NO.: HES3230

ULTIMATE DESTINATION: See page 2

CONDITIONS, NOTES, AND DESCRIPTIONS OF 10 CFR PART 110, APPENDIX P,
BYPRODUCT TO BE EXPORTED

(NOTE: SEE PAGE 3 FOR DEFINITIONS OF CATEGORY 1 AND CATEGORY 2)

Export to countries listed under 'Country(ies) of Ultimate Destination,' of Category 2 quantities of Am-241, Am-241/Be, Cf-252, Co-60, and Cs-137 for oil and gas well logging and perforating services 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 3 for Mandatory Pre-shipment Notifications.

The ultimate consignees must ensure that they maintain custody of the sealed sources at all times, and when not in use or when in transit must ensure they are stored securely in a manner that would prevent unauthorized removal or access.

Licensee shall submit by February 1 of each year one copy of a report of all americium shipments during the previous calendar year. 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.

License expiration date is based on established limits.

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

SIGNATURE:



NAME AND TITLE:

David L. Skeen, Deputy Director
Office of International Programs

DATE OF ISSUANCE:

February 1, 2018

EXPORT LICENSE

COUNTRIES OF ULTIMATE DESTINATION(S):

Antigua and Barbuda, Barbados, Belize, Benin, Bhutan, Bosnia and Herzegovina, Botswana, Burkina Faso, Burundi, Cambodia, Cape Verde, Central African Republic, Chad, Congo (Kinshasa), Dominica, East Timor, Eritrea, Fiji, Gambia, Georgia, Grenada, Guinea, Guinea-Bissau, Kenya, Kiribati, Kosovo, Kyrgyzstan, Laos, Lebanon, Lesotho, Liberia, Liechtenstein, Macedonia, Malawi, Maldives, Mali, Malta, Marshall Islands, Mauritius, Micronesia, Moldova, Monaco, Mongolia, Nauru, Nepal, Nicaragua, Oman, Palau, Rwanda, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Samoa, San Marino, Sao Tome and Principe, Senegal, Serbia, Seychelles, Sierra Leone, Solomon Islands, Somalia, Sri Lanka, Swaziland, Tajikistan, Tanzania, Togo, Tonga, Tuvalu, Uganda, Uzbekistan, Vanuatu, Zambia, and Zimbabwe.

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:

Advanced Notifications to the NRC are to be emailed to 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 301-816-5100.

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 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 301-287-9056.

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) ¹	Terabequerels (TBq)	Curies(Ci) ¹
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 ² (Pu-238)	60	1,600	0.6	16
Plutonium-239/Beryllium ² (Pu-239/Be)	60	1,600	0.6	16
Promethium-147 (Pm-147)	40,000	1,100,000	400	11,000
Radium-226 ³ (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
R2 = activity for radionuclides or source number 2
RN = activity for radionuclides or source number n

AR1 = activity limit for radionuclides or source number 1
AR2 = activity limit for radionuclides or source number 2
ARN = activity limit for radionuclides or source number n

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

¹ 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.

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

³ Discrete sources of Radium-226.