

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 37, 39, 40, 70 and 71, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

<p style="text-align: center;">Licensee</p> <p>1. Department of the Army U.S. Army Research Laboratory</p> <p>2. ATTN: RDRL-LO 2800 Powder Mill Road Adelphi, MD 20783</p>	<p>In accordance with letter dated December 9, 2016,</p> <p>3. License number: 19-12056-02 is amended in its entirety to read as follows:</p>	<p>4. Expiration Date: November 30, 2024</p> <p>5. Docket No.: 030-04555 Reference No.:</p>
<p>6. Byproduct, source, and/or special nuclear material</p> <p>A. Any byproduct material with Atomic Numbers 1 through 84</p>	<p>7. Chemical and/or physical form</p> <p>A. Sealed or plated sources</p>	<p>8. Maximum amount that licensee may possess at any one time under this license</p> <p>A. 101 millicuries per radionuclide and 8.5 curies total</p> <p>9. Authorized use</p> <p>A. For research and development as defined in 10 CFR 30.4, including calibration and checking of the licensee's instruments, analysis of environmental samples, and for processing and consolidation of waste of other Department of Army tenants located at Aberdeen Proving Grounds and Adelphi Laboratory Center.</p>

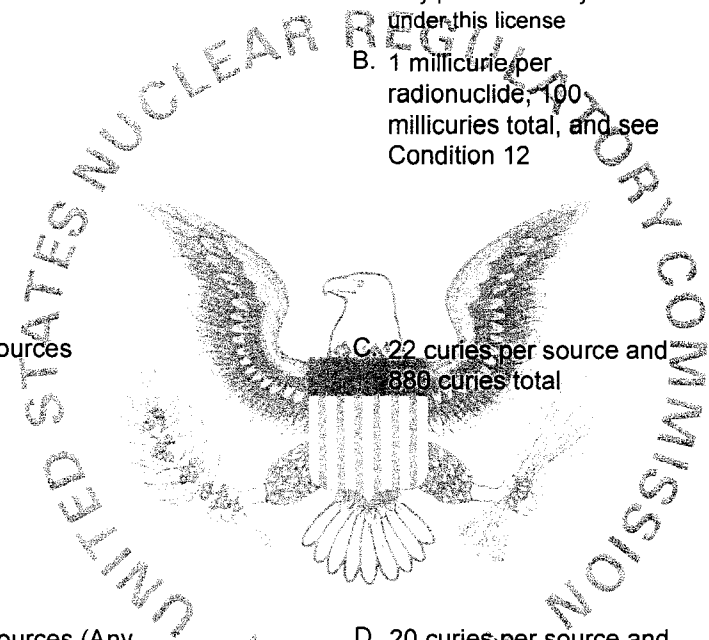
**MATERIALS LICENSE
SUPPLEMENTARY SHEET**

License Number
19-12056-02

Docket or Reference Number
030-04555

Amendment No. 29

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| <p>6. Byproduct, source, and/or special nuclear material</p> <p>B. Any byproduct material with Atomic Numbers 1 through 83</p> | <p>7. Chemical and/or physical form</p> <p>B. Any</p> | <p>8. Maximum amount that licensee may possess at any one time under this license</p> <p>B. 1 millicurie per radionuclide, 100 millicuries total, and see Condition 12</p> | <p>9. Authorized use</p> <p>B. For research and development as defined in 10 CFR 30.4, including calibration and checking of the licensee's instruments, analysis of environmental samples, and for processing and consolidation of waste of other Department of Army tenants located at Aberdeen Proving Grounds and Adelphi Laboratory Center.</p> |
| <p>C. Hydrogen-3</p> | <p>C. Sealed Sources</p> | <p>C. 22 curies per source and 880 curies total</p> | <p>C. For research and development as defined in 10 CFR 30.4, including calibration and checking of the licensee's instruments, analysis of environmental samples, and for processing and consolidation of waste of other Department of Army tenants located at Aberdeen Proving Grounds and Adelphi Laboratory Center.</p> |
| <p>D. Hydrogen-3</p> | <p>D. Sealed Sources (Any Electronic Neutron Generator)</p> | <p>D. 20 curies per source and 100 curies total</p> | <p>D. Storage and active use for detector development and testing and small scale proof of concept isomer research.</p> |
| <p>E. Cadmium-109</p> | <p>E. Sealed Sources (Isotope Products Laboratories, Model XFB Series)</p> | <p>E. 250 millicuries total</p> | <p>E. For research and development as defined in 10 CFR 30.4, including calibration and checking of the licensee's instruments, analysis of environmental samples, and for processing and consolidation of waste of other Department of Army tenants located at Aberdeen Proving Grounds and Adelphi Laboratory Center.</p> |



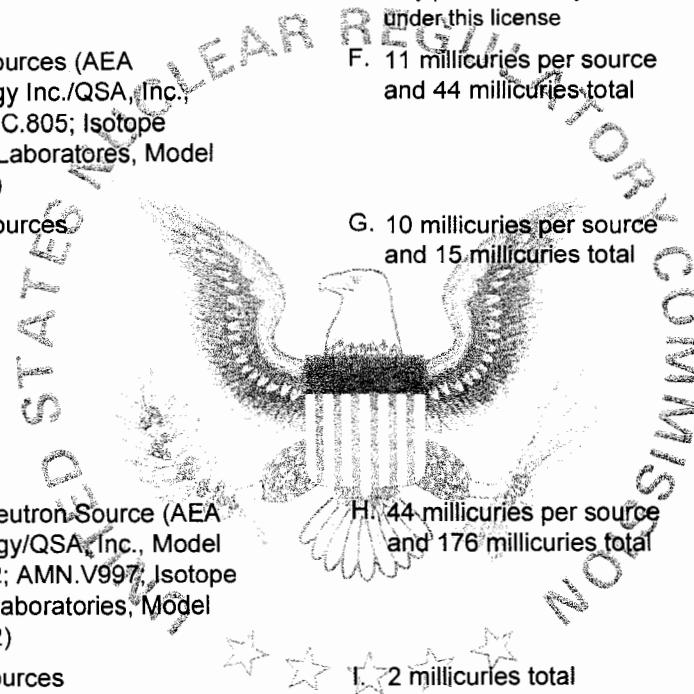
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| <p>6. Byproduct, source, and/or special nuclear material</p> <p>F. Cesium-137</p> <p>G. Radium-226</p> <p>H. Americium-241/ Beryllium</p> <p>I. Americium-241</p> | <p>7. Chemical and/or physical form</p> <p>F. Sealed Sources (AEA Technology Inc./QSA, Inc., Model CDC.805; Isotope Products Laboratories, Model HEG-137)</p> <p>G. Sealed Sources</p> <p>H. Sealed Neutron Source (AEA Technology/QSA, Inc., Model Am1.NO2; AMN.V997; Isotope Product Laboratories, Model Am1.NO2)</p> <p>I. Plated Sources</p> | <p>8. Maximum amount that licensee may possess at any one time under this license</p> <p>F. 11 millicuries per source and 44 millicuries total</p> <p>G. 10 millicuries per source and 15 millicuries total</p> <p>H. 44 millicuries per source and 176 millicuries total</p> <p>I. 2 millicuries total</p> | <p>9. Authorized use</p> <p>F. For use in Humbolt Scientific Inc Model 5001 or InstroTek, Inc. Model 3500 portable gauges for measuring physical properties of materials.</p> <p>G. For research and development as defined in 10 CFR 30.4, including calibration and checking of the licensee's instruments, analysis of environmental samples, and for processing and consolidation of waste of other Department of Army tenants located at Aberdeen Proving Grounds and Adelphi Laboratory Center.</p> <p>H. For use in Humbolt Scientific Inc Model 5001 or InstroTek, Inc. Model 3500 portable gauges for measuring physical properties of materials.</p> <p>I. For research and development as defined in 10 CFR 30.4, including calibration and checking of the licensee's instruments, analysis of environmental samples, and for processing and consolidation of waste of other Department of Army tenants located at Aberdeen Proving Grounds and Adelphi Laboratory Center.</p> |
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Amendment No. 29

CONDITIONS

10. Licensed material may be used or stored at the licensee's facilities located at Aberdeen Proving Ground, Maryland and Adelphi Laboratory Center, 2800 Powder Mill Road, Adelphi, Maryland, and at temporary job sites anywhere in the United States.
11. A. Licensed material shall only be used by, or under the supervision of, individuals designated, in writing, by the Radiation Safety Committee. The licensee shall maintain records of individuals designated as users for 3 years after the individual's last use of licensed material.

B. The Radiation Safety Officer (RSO) for this license is Patrick Marine.
12. In addition to the possession limits in Item 8, the licensee shall further restrict the possession of licensed material to quantities below the minimum limit specified in 10 CFR 30.35(d) for establishing decommissioning financial assurance.
13. The licensee shall not use the licensed material in or on humans.
14. The licensee shall not use licensed material in field applications where activity is released except as provided otherwise by specific condition of this license.
15. A. Sealed sources and detector cells shall be tested for leakage and/or contamination at intervals not to exceed the intervals specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission under 10 CFR 32.210 or by an Agreement State. In the absence of a registration certificate, sealed sources shall be tested for leakage and/or contamination at intervals not to exceed 6 months, or at such other intervals as specified.

B. Notwithstanding Paragraph A of this Condition, sealed sources designed to primarily emit alpha particles shall be tested for leakage and/or contamination at intervals not to exceed 3 months.

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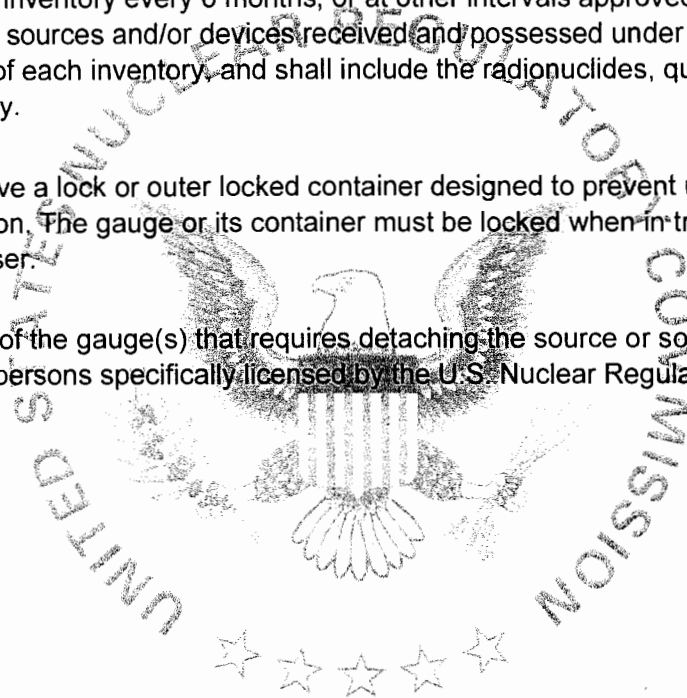
Amendment No. 29

- C. Each sealed source fabricated by the licensee shall be inspected and tested for construction defects, leakage, and contamination prior to any use or transfer as a sealed source.
- D. In the absence of a certificate from a transferor indicating that a leak test has been made within the intervals specified in the certificate of registration issued by the U.S. Nuclear Regulatory Commission under 10 CFR 32.210 or by an Agreement State, prior to the transfer, a sealed source received from another person shall not be put into use until tested and the test results received.
- E. Sealed sources need not be tested if they contain only hydrogen 3; or they contain only a radioactive gas; or the half-life of the isotope is 30 days or less; or they contain not more than 100 microcuries of beta- and/or gamma-emitting material or not more than 10 microcuries of alpha-emitting material.
- F. Sealed sources need not be tested if they are in storage and are not being used. However, when they are removed from storage for use or transferred to another person, and have not been tested within the required leak test interval, they shall be tested before use or transfer. No sealed source shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.
- G. The leak test shall be capable of detecting the presence of 185 becquerels (0.005 microcuries) of radioactive material on the test sample. If the test reveals the presence of 185 becquerels (0.005 microcuries) or more of removable contamination, a report shall be filed with the U.S. Nuclear Regulatory Commission in accordance with 10 CFR 30.50(c)(2), and the source shall be removed immediately from service and decontaminated, repaired, or disposed of in accordance with Commission regulations.
- H. Tests for leakage and/or contamination, including leak test sample collection and analysis, shall be performed by the licensee or other persons specifically licensed by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services.
- I. Records of leak test results shall be kept in units of becquerels (microcuries) and shall be maintained for 3 years.
16. Sealed sources, source rods, foil sources, or detector cells containing licensed material shall not be opened or sources removed from source holders or detached from source rods, or foil sources removed from detector cells by the licensee, except as specifically authorized.

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Amendment No. 29

17. The licensee shall conduct a physical inventory every 6 months, or at other intervals approved by the U.S. Nuclear Regulatory Commission, to account for all sealed sources and/or devices received and possessed under the license. Records of inventories shall be maintained for 3 years from the date of each inventory, and shall include the radionuclides, quantities, manufacturer's name and model numbers, and the date of the inventory.
18. Each portable nuclear gauge shall have a lock or outer locked container designed to prevent unauthorized or accidental removal of the sealed source from its shielded position. The gauge or its container must be locked when in transport or storage, or when not under the direct surveillance of an authorized user.
19. Any cleaning, maintenance, or repair of the gauge(s) that requires detaching the source or source rod from the gauge shall be performed only by the manufacturer or by other persons specifically licensed by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services.

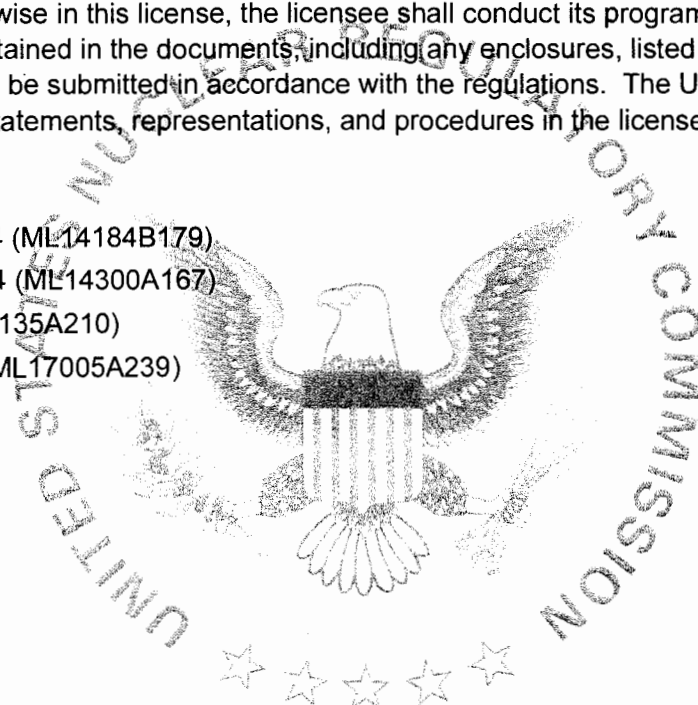


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20. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below. This license condition applies only to those procedures that are required to be submitted in accordance with the regulations. The U.S. Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

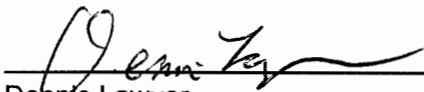
- A. Memorandum dated June 5, 2014 (ML14184B179)
- B. Application dated October 1, 2014 (ML14300A167)
- C. Letter dated May 11, 2015 (ML15135A210)
- D. Letter dated December 9, 2016 (ML17005A239)



FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date: February 1, 2017

By: _____


Dennis Lawyer
Region 1