

**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;"><b>Licensee</b></p> <p>1. National Aeronautics &amp; Space Administration John H. Glenn Research Center</p> <p>2. 21000 Brookpark Road Mailstop 6-4 Cleveland, OH 44135</p>	<p>In accordance with letter dated September 26, 2016,</p> <p>3. License No.: 34-00507-16 is amended in its entirety to read as follows:</p>	<p>4. Expiration Date: March 31, 2025</p> <p>5. Docket No.: 030-05626 Reference No.:</p>	
<p>6. Byproduct, source, and/or special nuclear material</p> <p>A. Any byproduct material between Atomic Numbers 3 and 83</p> <p>B. Strontium-90</p> <p>C. Americium-241</p>	<p>7. Chemical and/or physical form</p> <p>A. Activation products</p> <p>B. Sealed source (Isotope Products Laboratories, Model LB-90)</p> <p>C. Plated source (Isotope Products Laboratories, Model AFR Series)</p>	<p>8. Maximum amount that licensee may possess at any one time under this license</p> <p>A. Not to exceed 200 millicuries per isotope</p> <p>B. 1 microcurie per source and 1 microcurie total</p> <p>C. 100 microcuries per source and 100 microcuries total</p>	<p>9. Authorized use</p> <p>A. For research and development as described in 10 CFR 30.4. Possession incident to the radiological characterization surveys of a shut-down cyclotron. Includes collection and analysis of samples and interference removal of activated equipment and infrastructure associated with the licensee's cyclotron facility.</p> <p>B. For research and development as described in 10 CFR 30.4.</p> <p>C. For research and development as described in 10 CFR 30.4.</p>

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6. Byproduct, source,  
and/or special nuclear  
material

D. Americium-241

E. Uranium - depleted  
in Uranium-235

F. Cesium-137

G. Promethium-145

H. Cesium-137

I. Americium-241

7. Chemical and/or physical form

D. Foils (AEA Technologies, Model  
AMM.1001H; Nycomed  
Amersham Plc, Model  
AMM.1001H)

E. Alloy

F. Sealed sources (Isotope  
Products Laboratories, Model  
LB-137; NBS Standard, Model  
4200-128 and 4207-162)G. Sealed source (NEN, Model  
X-2 X-ray Reference Source)H. Sealed source (Troxler, Model  
Drawing No. A-102112)I. Sealed source (Troxler, Model  
Drawing No. A-102451)8. Maximum amount that licensee  
may possess at any one time  
under this licenseD. 1 microcurie per source  
and 20 microcuries total

E. 84 kilograms total

F. 15 microcuries per source  
and 30 microcuries totalG. 1 microcurie per source  
and 1 microcurie totalH. 9 millicuries per source  
and 9 millicuries totalI. 44 millicuries per source  
and 44 millicuries total

9. Authorized use

D. For research and development as  
described in 10 CFR 30.4.E. For research and development as  
described in 10 CFR 30.4 and in  
accordance with letter dated July 1,  
2015.F. Possession and storage only with  
intent to dispose.G. Possession and storage only with  
intent to dispose.H. In Troxler Electronic Laboratories Model  
3440 Plus portable gauging devices for  
measuring physical properties of  
materials and for research and  
development as described in 10 CFR  
30.4.I. In Troxler Electronic Laboratories Model  
3440 Plus portable gauging devices for  
measuring physical properties of  
materials and for research and  
development as described in 10 CFR  
30.4.

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|--|----------------------------------|--|--|
| 6. Byproduct, source, and/or special nuclear material      | 7. Chemical and/or physical form | 8. Maximum amount that licensee may possess at any one time under this license | 9. Authorized use  |
| J. Any byproduct material with Atomic Numbers 1 through 83 | J. Environmental samples         | J. 1.4 microcuries per source and 11 microcuries total                         | J. For use in Radiological and Environmental Sciences Laboratory (RESL) Mixed Analyte Performance Program (MAPEP) samples with gamma spectroscopy systems in support of decommissioning tasks. |
| K. Uranium-234   | K. Environmental samples         | K. 47 nanocuries total   | K. For use in Radiological and Environmental Sciences Laboratory (RESL) Mixed Analyte Performance Program (MAPEP) samples with gamma spectroscopy systems in support of decommissioning tasks. |
| L. Uranium-238   | L. Environmental samples         | L. 47 nanocuries total   | L. For use in Radiological and Environmental Sciences Laboratory (RESL) Mixed Analyte Performance Program (MAPEP) samples with gamma spectroscopy systems in support of decommissioning tasks. |
| M. Plutonium-238   | M. Environmental samples         | M. 47 nanocuries total   | M. For use in Radiological and Environmental Sciences Laboratory (RESL) Mixed Analyte Performance Program (MAPEP) samples with gamma spectroscopy systems in support of decommissioning tasks. |
| N. Plutonium-239   | N. Environmental samples         | N. 47 nanocuries total   | N. For use in Radiological and Environmental Sciences Laboratory (RESL) Mixed Analyte Performance Program (MAPEP) samples with gamma spectroscopy systems in support of decommissioning tasks. |

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6. Byproduct, source,  
and/or special nuclear  
material

O. Americium-241

P. Americium-241

Q. Cesium-137

R. Europium-152

7. Chemical and/or physical form

O. Environmental samples

P. Calibration and standard  
reference sourcesQ. Calibration and standard  
reference sourcesR. Calibration and standard  
reference sources8. Maximum amount that licensee  
may possess at any one time  
under this license

O. 47 nanocuries total

P. 0.2 microcuries per source  
and 2 microcuries totalQ. 0.06 microcuries per  
source and 0.6  
microcuries totalR. 0.5 microcuries per source  
and 5 microcuries total

9. Authorized use

O. For use in Radiological and  
Environmental Sciences Laboratory  
(RESL) Mixed Analyte Performance  
Program (MAPEP) samples with  
gamma spectroscopy systems in  
support of decommissioning tasks.P. For use in Eckert and Ziegler Analytics,  
Inc., custom sources for instrument  
calibration.Q. For use in Eckert and Ziegler Analytics,  
Inc., custom sources for instrument  
calibration.R. For use in Eckert and Ziegler Analytics,  
Inc., custom sources for instrument  
calibration.**CONDITIONS**

10. Licensed material may be used or stored at the licensee's facilities located at:

A. John H. Glenn Research Center at Lewis Field, 21000 Brookpark Road, Cleveland, Ohio, 44135

B. John H. Glenn Research Center at Plum Brook Station, 6100 Columbus Avenue, Sandusky, Ohio, 44870

Licensed material in Subitems 6.H. and 6.I. may be used at temporary job sites anywhere in the United States where the U.S. Nuclear Regulatory Commission maintains jurisdiction for regulating the use of licensed material, including areas of exclusive Federal jurisdiction within Agreement States.

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If the jurisdiction status of a Federal facility within an Agreement State is unknown, the licensee should contact the Federal agency controlling the job site in question to determine whether the proposed job site is an area of exclusive Federal jurisdiction. Authorization for use of radioactive materials at job sites in Agreement States not under exclusive Federal jurisdiction shall be obtained from the appropriate state regulatory agency.

11. A. Licensed material in Subitems 6.A. through 6.G. and 6.J. through 6.R. shall only be used by, or under the supervision of, Christopher J. Blasio, M.S., or Roderick C. Case.
- B. Licensed material in Subitems 6.H. and 6.I. shall only be used by, or under the supervision and in the physical presence of, Christopher J. Blasio, M.S., or other individuals who have successfully completed the training described in the letter dated March 25, 2015.
12. The Radiation Safety Officer (RSO) for this license is Christopher J. Blasio, M.S.
13. Maintenance, repair, cleaning, replacement and disposal of foils contained in detector cells shall be performed only by the device manufacturer or other persons specifically authorized by the Commission or an Agreement State to perform such services.
14. A. Sealed sources, detector cells, and foil sources 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 under equivalent regulations of an Agreement State.
- B. 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 U.S. Nuclear Regulatory Commission under 10 CFR 32.210 or under equivalent regulations of an Agreement State, prior to transfer, a sealed source, detector cell or foil source received from another person shall not be put into use until tested and the test results received.
- C. Sealed sources need not be leak 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.

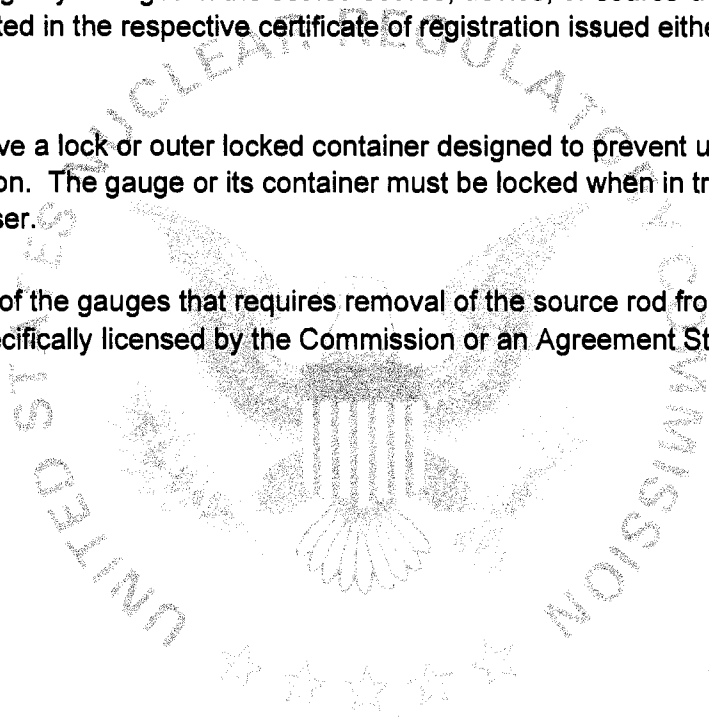
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- D. Sealed sources need not be leak tested if they are in storage and are not being used. However, when they are removed from storage for use or transferred to another person, and have not been tested within the required leak test interval, they shall be tested before use or transfer. No sealed source or detector cell shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.
- E. The leak test shall be capable of detecting the presence of 0.005 microcurie (185 becquerels) of radioactive material on the test sample. If the test reveals the presence of 0.005 microcurie (185 becquerels) 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.
- F. Tests for leakage and/or contamination shall be performed by the licensee or by other persons specifically licensed by the Commission or an Agreement State to perform such services.
- G. Records of leak test results shall be kept in units of microcuries and shall be maintained for three years.
15. Sealed sources, source rods, detector cells, or foil sources containing licensed material shall not be opened or sources removed or detached from source rods, gauges, or other source holders by the licensee, except as specifically authorized.
16. The licensee shall conduct a physical inventory every six months, or at other interval 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 five 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.

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17. Except for maintaining labeling as required by 10 CFR Part 20, or 71, the licensee shall obtain authorization from the U.S. Nuclear Regulatory Commission before making any changes in the sealed source, device, or source-device combination that would alter the description or specifications as indicated in the respective certificate of registration issued either by the Commission pursuant to 10 CFR 32.210 or by an Agreement State.
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 gauges that requires removal of the source rod from the gauge shall be performed only by the manufacturer or by other persons specifically licensed by the 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. 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. Application dated September 22, 2014 (excluding attached NASA Occupational Health Manual Chapter 8 entitled "Radiation Protection for Radioactive Materials") (ML14272A564)
  - B. Letter dated December 2, 2014 (ML14337A372)
  - C. Letter dated March 25, 2015 (including attached Radiation Safety Briefing sheet and excluding item 2) (ML15091A443)
  - D. Letter dated July 1, 2015 (ML15188A494)
  - E. Letter dated September 26, 2016 (ML16278A473)
  - F. Letter dated October 24, 2016 (ML16298A397)

FOR THE U. S. NUCLEAR REGULATORY COMMISSION

Date: NOV 10 2016By: BAPhBryan A. Parker  
Region III