

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.

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| <p style="text-align: center;">Licensee</p> <p>1. National Aeronautics & 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 March 28, 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>6. Byproduct, source, and/or special nuclear material</p> <p>A. Any byproduct material with Atomic Nos. 3 through 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 sources (Isotope Products, Inc.)</p> <p>C. Plated sources (Isotope Products Laboratory, 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 defined 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 defined in 10 CFR 30.4.</p> <p>C. For research and development as defined in 10 CFR 30.4.</p> | |

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Docket or Reference Number
030-05626

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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 |
|---------------------------------------------------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| D. Americium-241 | D. Foils (AEA Technologies, Model AMM.1001H; Nycomed, Amersham Plc, Model AMM.1001H) | D. 1 microcurie per source and 20 microcuries total | D. For research and development as defined in 10 CFR 30.4. |
| E. Uranium - depleted in Uranium-235 | E. Alloy | E. 84 kilograms total | E. For research and development as defined in 10 CFR 30.4 and in accordance with letter dated July 1, 2015. |
| F. Cesium-137 | F. Sealed sources (Isotopes Products, Inc., Model LB-137; NBS Standard, Model 4200-128 and 4207-162) | F. 15 microcuries per source and 30 microcuries total | F. Possession and storage only with intent to dispose. |
| G. Promethium-145 | G. Sealed sources (NEN, Model X-2 X-ray Reference Source) | G. 1 microcurie per source and 1 microcurie total | G. Possession and storage only with intent to dispose. |
| H. Cesium-137 | H. Sealed sources (Troxler, Model Drawing No. A102112) | H. 9 millicuries total | H. For research and development as defined in 10 CFR 30.4 in a Troxler Model No. 3440 Plus portable gauging device. |
| I. Americium-241 | I. Sealed sources (Troxler, Model Drawing No. A-102451) | I. 44 millicuries total | I. Same as Item 9.H. |
| J. Any byproduct material with Atomic Nos. 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. Same as Item 9.J. |
| L. Uranium-238 | L. Environmental samples | L. 47 nanocuries total | L. Same as Item 9.J. |

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| M. Plutonium-238 | M. Environmental samples | M. 47 nanocuries total | M. Same as Item 9.J. |
| N. Plutonium-239 | N. Environmental samples | N. 47 nanocuries total | N. Same as Item 9.J. |
| O. Americium-241 | O. Environmental samples | O. 47 nanocuries total | O. Same as Item 9.J. |
| P. Americium-241 | P. Calibration and standard reference sources | P. 0.2 microcuries per source and 2 microcuries total | P. For use in Eckert and Ziegler Analytics, Inc., custom sources for instrument calibration. |
| Q. Cesium-137 | Q. Calibration and standard reference sources | Q. 0.06 microcuries per source and 0.6 microcuries total | Q. Same as Item 9.P. |
| R. Europium-152 | R. Calibration and standard reference sources | R. 0.5 microcuries per source and 5 microcuries total | R. Same as Item 9.P. |

CONDITIONS

10. A. Licensed material may be used or stored only at the licensee's facilities located at:
1. John H. Glenn Research Center at Plum Brook Station, 6100 Columbus Avenue, Sandusky, Ohio, 44870
 2. John H. Glenn Research Center at Lewis Field, 21000 Brookpark Road, Cleveland, Ohio, 44135
- B. Licensed material in Subitems 6.H. and 6.I. may be used and stored at temporary job sites of the licensee anywhere in the United States where the U.S. Nuclear Regulatory Commission maintains jurisdiction for regulating the use of licensed material.

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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. 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.
14. 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.
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 six months, or at such other intervals as specified.
- 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 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.

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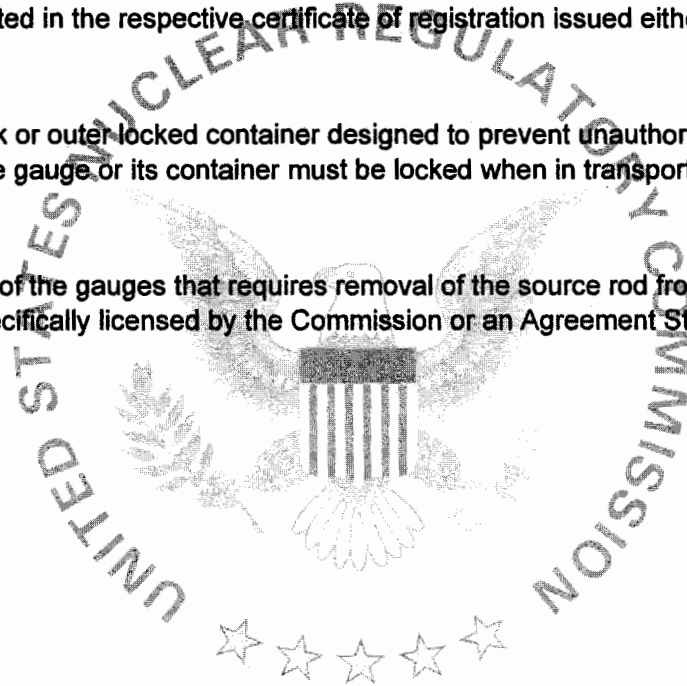
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- C. Sealed sources need not be tested if they contain only hydrogen-3; or they contain only a radioactive gas; or the half-life of the isotope is 30 days or less; or they contain not more than 100 microcuries of beta- and/or gamma-emitting material or not more than 10 microcuries of alpha-emitting material.
- D. 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.
- E. 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.
- F. 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.
- G. Records of leak test results shall be kept in units of becquerels (microcuries) and shall be maintained for three years.
16. 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.
17. 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 three 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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18. 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.
19. Each portable 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 direct surveillance of an authorized user.
20. 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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21. 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. 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, 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)
 - G. Letter dated March 28, 2016 (ML16117A276)



FOR THE U. S. NUCLEAR REGULATORY COMMISSION

Date: December 27, 2017

By: _____



Bryan A. Parker
Region III