

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, and 70, 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.

Licensee 1. Kalamazoo College 2. 1200 Academy Street Kalamazoo, MI 49006	In accordance with application dated December 4, 2013, 3. License number 21-13658-01 is renewed in its entirety to read as follows: 4. Expiration date May 31, 2024 5. Docket No. 030-00830 Reference No.																			
<table border="0"><tr><td>6. Byproduct, source, and/or special nuclear material</td><td>7. Chemical and/or physical form</td><td>8. Maximum amount that licensee may possess at any one time under this license</td></tr><tr><td>A. Hydrogen-3</td><td>A. Any</td><td>A. 5 millicuries</td></tr><tr><td>B. Carbon-14</td><td>B. Any</td><td>B. 5 millicuries</td></tr><tr><td>C. Sulphur-35</td><td>C. Any</td><td>C. 10 millicuries</td></tr><tr><td>D. Phosphorus-32</td><td>D. Any</td><td>D. 10 millicuries</td></tr><tr><td>E. Cobalt-60</td><td>E. Sealed source [Du Pont Merck Pharmaceutical Co. (formerly New England Nuclear) Model NER-580]</td><td>E. 10 millicuries</td></tr></table>	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	A. Hydrogen-3	A. Any	A. 5 millicuries	B. Carbon-14	B. Any	B. 5 millicuries	C. Sulphur-35	C. Any	C. 10 millicuries	D. Phosphorus-32	D. Any	D. 10 millicuries	E. Cobalt-60	E. Sealed source [Du Pont Merck Pharmaceutical Co. (formerly New England Nuclear) Model NER-580]	E. 10 millicuries	9. Authorized use: A. through E. Research and development as defined in Title 10 of the <i>Code of Federal Regulations</i> Section 30.4 and for teaching and training of students.	
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CONDITIONS

10. Licensed material may be used or stored only at the licensee's facilities located at the Dow Science Center and Olds/Upton Science Building, 1200 Academy Street, Kalamazoo, Michigan.
11. The Radiation Safety Officer for this license is James A. Langeland, Ph.D.
12. Licensed material is only authorized for use by the individuals as noted below:
- | | |
|---------------------------------|-------------------------------|
| James A. Langeland, Ph.D. | Sulphur-35 and phosphorus-32. |
| Laura L. Furge, Ph.D. | Hydrogen-3 and carbon-14. |
| Thomas R. Askew, Ph.D. | Cobalt-60. |
| Sarah Elizabeth McDowell, Ph.D. | Phosphorus-32. |

**MATERIALS LICENSE
SUPPLEMENTARY SHEET**

License Number

21-13658-01

Docket or Reference Number

030-00830

Amendment No. 14

13. A. Sealed 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 the U.S. Nuclear Regulatory Commission under 10 CFR 32.210 or under equivalent regulations of an Agreement State, prior to the transfer, a sealed source or detector cell received from another person shall not be put into use until tested.
- 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.
- 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 ten 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 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.
14. Sealed sources or detector cells containing licensed material shall not be opened or sources removed or detached from source holders by the licensee.
15. Licensed material shall not be used in or on human beings.
16. The licensee is authorized to hold radioactive material with a physical half-life of less than or equal to 120 days for decay-in-storage before disposal in ordinary trash provided:
- A. Before disposal as ordinary trash, byproduct material shall be surveyed at the container surface with the appropriate meter set on its most sensitive scale and with no interposed shielding to determine that its radioactivity cannot be distinguished from background. All radiation labels shall be removed or obliterated.

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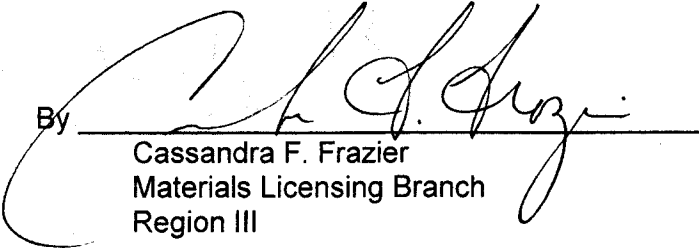
Amendment No. 14

- B. A record of each disposal permitted under this License Condition shall be retained for three years. The record must include the date of disposal, the date on which the byproduct material was placed in storage, the radionuclides disposed, the survey instrument used, the background dose rate, the dose rate measured at the surface of each waste container, and the name of the individual who performed the disposal.
17. The licensee shall conduct a physical inventory every six months, or at other intervals approved by the U.S. Nuclear Regulatory Commission, to account for all sources and/or devices received and possessed under the license.
18. This license does not authorize commercial distribution of licensed material.
19. The licensee shall not use licensed material in field applications where activity is released except as provided otherwise by specific condition of this license.
20. The licensee is authorized to transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."
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. 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 December 4, 2013; and
- B. Letter dated April 17, 2014.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date MAY 07 2014

By


Cassandra F. Frazier
Materials Licensing Branch
Region III