

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.

Licensee 1. Michigan Technological University 2. 1400 Townsend Drive Houghton, MI 49931-1295		In accordance with letter dated October 18, 2019. 3. License number: 21-00278-02	4. Expiration Date: December 31, 2022 5. Docket No.: 030-00810 Reference No.:
6. Byproduct, source, and/or special nuclear material A. Hydrogen-3 B. Carbon-14 C. Phosphorus-32 D. Phosphorus-33 E. Sulfur-35 F. Cesium-137 G. Cobalt-57	7. Chemical and/or physical form A. Any B. Any C. Any D. Any E. Any F. Any G. Foils (WEB Research Co. Inc., Model MCo7 Series)	8. Maximum amount that licensee may possess at any one time under this license A. 30 millicuries total B. 30 millicuries total C. 25 millicuries total D. 20 millicuries total E. 15 millicuries total F. 0.1 millicuries total G. 1 source not to exceed 20 millicuries	9. Authorized use A. For research and development as defined in 10 CFR 30.4. B. For research and development as defined in 10 CFR 30.4. C. For research and development as defined in 10 CFR 30.4. D. For research and development as defined in 10 CFR 30.4. E. For research and development as defined in 10 CFR 30.4. F. For use in analytical equipment as calibration and check sources. G. For storage only incident to disposal.

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SUPPLEMENTARY SHEET**License Number
21-00278-02

Amendment No. 71

Docket or Reference Number
030-00810

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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 |
| H. Nickel-63 | H. Foils | H. 150 millicuries total | H. To be used for sample analysis in compatible gas chromatography devices that have been registered with NRC either under 10 CFR 32.210 or with an Agreement State and have been distributed in accordance with an NRC or Agreement State specific license authorizing distribution to persons specifically authorized by an NRC or Agreement State license to receive, possess, and use the device. |
| I. Uranium- depleted in Uranium-235 | I. Metal | I. 571 grams total | I. For storage only incident to disposal. |

CONDITIONS

10. Licensed material may be used or stored at the licensee's facilities located at 1400 Townsend Drive, Houghton, Michigan, 49931.
11. The Radiation Safety Officer (RSO) for this license is David C. Dixon, Ph.D.
12. Licensed material shall only be used by, or under the supervision of:

Authorized Users

Martin T. Auer, Ph.D.
Jennifer G. Becker, Ph.D.
David L. Perram

Material and Use

Hydrogen-3, carbon-14, phosphorus-33, cesium-137
Carbon-14
Nickel-63 (gas chromatographs)

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Authorized Users

Guiliang Tang, Ph.D.

Xiaoqing Tang, Ph.D.

Noel R. Urban, Ph.D.

Trista Vick-Majors, Ph.D.

Material and Use

Phosphorus-32, phosphorus-33, cesium-137

Hydrogen-3, carbon-14, phosphorus-32, cesium-137

Hydrogen-3, carbon-14, phosphorus-32, phosphorus-33, sulfur-35, cesium-137

Hydrogen-3, carbon-14

13. Licensed material shall not be used in or on human beings.
14. Detector cells containing licensed material shall not be opened or the sources removed from the detector cell by the licensee.
15. 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.
16. Sealed sources containing licensed material shall not be opened by the licensee.
17. 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 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 no 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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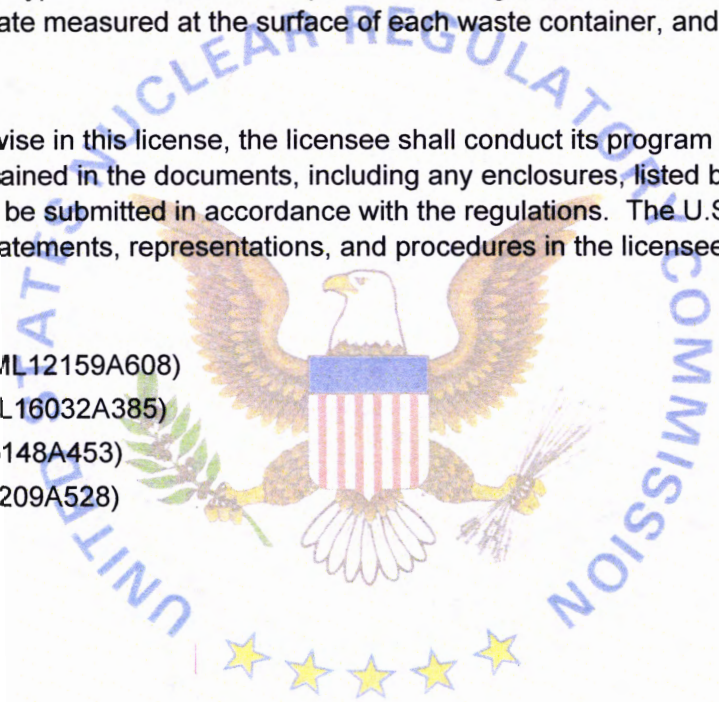
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- D. Sealed sources need not be tested if they are in storage, and are not being used. However, when they are removed from storage for use or transferred to another person, and have not been tested within the required leak test interval, they shall 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 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, limited to leak test sample collection, shall be performed by the licensee or by 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 microcuries and shall be maintained for three years.
18. 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. 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.
19. 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, the waste shall be surveyed at the container surface with the appropriate survey instrument 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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- B. A record of each such 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.
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. Application dated June 5, 2012 (ML12159A608)
 - B. Letter dated February 1, 2016 (ML16032A385)
 - C. Letter dated May 25, 2016 (ML16148A453)
 - D. Letter dated July 27, 2016 (ML16209A528)



FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date: January 15, 2020By: Colleen Carol CaseyColleen Carol Casey
Region 3