

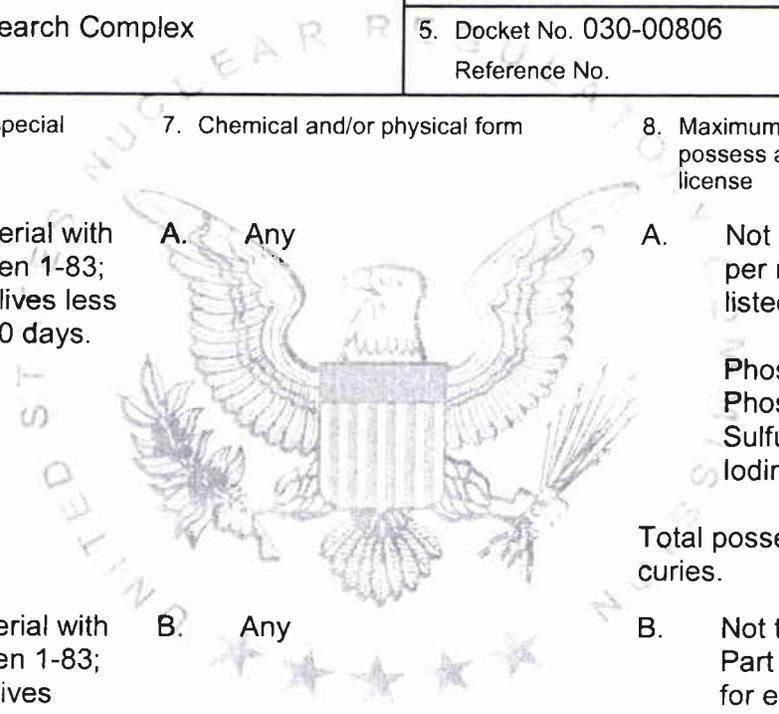
MATERIALS LICENSE

Corrected Copy

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, 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.

<p style="text-align: center;">Licensee</p> <p>1. Michigan State University Office of Radiation, Chemical and Biological Safety C-124 Engineering Research Complex East Lansing, MI 48824</p>	<p>In accordance with letter dated April 30, 2008,</p> <p>3. License number 21-00021-29 is amended in its entirety to read as follows:</p> <hr/> <p>4. Expiration date June 30, 2012</p> <hr/> <p>5. Docket No. 030-00806 Reference No.</p>
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<p>6. Byproduct, source, and/or special nuclear material</p> <p>A. Any byproduct material with Atomic Nos. between 1-83; inclusive, with half-lives less than or equal to 120 days.</p> <p>B. Any byproduct material with Atomic Nos. between 1-83; inclusive, with half-lives greater than 120 days.</p> <p>C. Any byproduct material, special nuclear material and/or source material.</p> <p>D. Nickel-63</p>	<p>7. Chemical and/or physical form</p> <p>A. Any</p> <p>B. Any</p> <p>C. Any environmental sample collected from an unrestricted area.</p> <p>D. Plated/Foil sources (registered pursuant to Section 32.210 of 10 CFR Part 32 or an Agreement State)</p>	<p>8. Maximum amount that licensee may possess at any one time under this license</p> <p>A. Not to exceed 500 millicuries per radionuclide except as listed below:</p> <table style="margin-left: 20px;"> <tr> <td>Phosphorus-32</td> <td>3 curies</td> </tr> <tr> <td>Phosphorus-33</td> <td>2 curies</td> </tr> <tr> <td>Sulfur-35</td> <td>5 curies</td> </tr> <tr> <td>Iodine-125</td> <td>5 curies</td> </tr> </table> <p>Total possession not to exceed 25 curies.</p> <p>B. Not to exceed 10⁵ X 10 CFR Part 30, Appendix B limits for each radionuclide. Total possession not to exceed R/10⁵ is less than or equal to 1; R is the sum of the ratios of the quantity of each radionuclide to the applicable value in 10 CFR Part 30, Appendix B.</p> <p>C. Unspecified radioactivity content (samples collected from unrestricted area).</p> <p>D. No single cell to exceed 15 millicuries. Total not to exceed 2 curies.</p>	Phosphorus-32	3 curies	Phosphorus-33	2 curies	Sulfur-35	5 curies	Iodine-125	5 curies
Phosphorus-32	3 curies									
Phosphorus-33	2 curies									
Sulfur-35	5 curies									
Iodine-125	5 curies									



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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
E. Cesium-137	E. Sealed sources (registered pursuant to Section 32.210 of 10 CFR Part 32 or an Agreement State)	E. No single source to exceed 100 millicuries. Total not to exceed 6 curies.
F. Cobalt-60	F. Sealed source (registered pursuant to Section 32.210 of 10 CFR Part 32 or an Agreement State)	F. No single source to exceed 150 millicuries. Total possession not to exceed 200 millicuries.
G. Thorium-228	G. Thorium Nitrate	G. 2 millicuries.
H. Any byproduct material with Atomic Nos. between 84-108, inclusive	H. Sealed sources, foils, and target materials.	H. No single source to exceed 50 millicuries. Total possession not to exceed 500 millicuries.
I. Americium-241	I. Sealed sources (registered pursuant to Section 32.210 of 10 CFR Part 32 or an Agreement State)	I. No single source exceed 50 millicuries. Total possession not to exceed 300 millicuries.
J. Plutonium-239	J. Encapsulated as Pu-Be Neutron sources (Monsanto Research)	J. 3 sources with the following amounts: 1 source of 82 grams; 1 source of 33 grams; and 1 source of 8.1 grams. Total possession not to exceed 123.1 grams.
K. Americium-241/Beryllium	K. Sealed source(AEA Technology QSA Inc. (formerly Amersham) Model X.3)	K. 1 source not to exceed 1.0 curie.
L. Americium-241/Beryllium	L. Sealed source (Gammatron/NSSI Model No. DA-5)	L. 1 source not to exceed 5.0 curies.
M. Cesium-137	M. Sealed source (JL Shepherd Model 6810)	M. 200 millicuries

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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 |
| N. Technetium-99m permitted by 10 CFR 35.200 | N. Any | N. 1.0 curie |

9. Authorized Use:

- A., B., and H. Research and development as defined in 30.4 of 10 CFR part 30, including animal studies. Carbon-14 labeled pesticide may be used in trees as described in letter dated April 27, 2004.
- C. Possession and use of any radioactive material that may be contained in environmental samples that have been collected from unrestricted areas (as defined in 10 CFR Part 20) for use in feeding of environmental fish samples to mink. The licensee may subsequently dispose of all material including the transfer of mink flesh to other laboratories for analysis of non-radioactive constituents. The licensee may receive, use, transfer, and/or dispose of these materials in accordance with procedures described in its letters dated July 15, 1993, and August 11, 1993.
- D. For use in gas chromatographs for sample analysis.
- E. To be used in source holders registered with the NRC pursuant to Section 32.210 of 10 CFR Part 32 or an Agreement State for the purpose of level measurements or instrument calibration.
- F. To be used in source holders registered with the NRC pursuant to Section 32.210 of 10 CFR Part 32 or an Agreement State for the purpose of instrument calibration.
- G. For use at the NSCL for research in equipment testing.
- I. For use in a NRC and/or Agreement State approved moisture/density gauge for the measurement of moisture content of materials.
- J. For use in student instruction and instrument calibration for neutron detection equipment.
- K. and L. To be used for instrument calibration for neutron detection equipment.
- M. To be used for calibration of gamma detection equipment.
- N. Technetium-99m for cardiac diagnostic imaging permitted by 10 CFR 35.200.**

CONDITIONS

10. Licensed materials shall be used at the campus facilities and/or extensions of Michigan State University as approved by the Michigan State University Radiation Safety Committee and as noted below:
- A. The licensee may also receive and use licensed material at Michigan State University, W. K. Kellogg

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Biological Station, 3700 East Gull Lake Drive, Hickory Corners, Michigan and VanAndel Research Institute, 333 Bostwick, Grand Rapids, Michigan.

- B. The licensee may also use material in Subitem I. at temporary job sites throughout the State of Michigan.
- C. The licensee may also use material in Subitem D. at temporary job sites where the U.S. Nuclear Regulatory Commission maintains jurisdiction for the use of licensed material.
11. A. The Radiation Safety Officer for this license is **Kristin Farrell Bronson**.
- B. The Assistant Radiation Safety Officer for material identified in Subitem 6.N. is George Abela, M.D.**
12. A. Licensed material, except ~~Subitem 6.C.~~, shall be used by ~~or~~ under the supervision of individuals designated by the Radiation Safety Committee, Gale I. Harris, Ph.D., Chairperson.
- B. Licensed material in Subitem C. shall be used by ~~or~~ under the supervision of Kristin Erickson, Radiation Safety Officer.
- C. Licensed material in Subitem 6.N. shall be used by or under the supervision of George Abela, M.D.**
13. A. Sealed sources and detector cells shall be tested for leakage and/or contamination at intervals not to exceed 6 months or at such other intervals as specified by the certificate of registration referred to in 10 CFR 32.210.
- B. Notwithstanding Paragraph A of this Condition, sealed sources designed to emit alpha particles shall be tested for leakage and/or contamination at intervals not to exceed 3 months.
- C. In the absence of a certificate from a transferor indicating that a leak test has been made within 6 months prior to the transfer, a sealed source or detector cell received from another person shall not be put into use until tested.
- D. 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.
- E. Sealed sources need not be leak tested if:
- (i) they contain only hydrogen-3; or
 - (ii) they contain only a radioactive gas; or
 - (iii) the half-life of the isotope is 30 days or less; or

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- (iv) they contain not more than 100 microcuries of beta and/or gamma emitting material or not more than 10 microcuries of alpha emitting material; or
- (v) they are not designed to emit alpha particles, 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.
- F. The leak test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. If the test reveals the presence of 0.005 microcurie or more of removable contamination, a report shall be filed with the U.S. Nuclear Regulatory Commission in accordance with 10 CFR 30.50(b)(2), and the source shall be removed immediately from service and decontaminated, repaired, or disposed of in accordance with Commission regulations. The report shall be filed within 5 days of the date the leak test result is known with the U.S. Nuclear Regulatory Commission, Region III, ATTN: Director, Division of Nuclear Materials Safety, 2443 Warrenville Road, Suite 210, Lisle, Illinois 60532-4352. The report shall specify the source involved, the test results, and corrective action taken.
- G. 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.
14. Sealed sources or detector cells containing licensed material shall not be opened or sources removed from source holders by the licensee.
15. The licensee is authorized to hold radioactive material with a physical half-life of less than 90 days for decay-in-storage before disposal in ordinary trash provided:
- A. Radioactive waste to be disposed of in this manner shall be held for decay a minimum of 10 half-lives.
- B. Before disposal as ordinary trash, byproduct material shall be surveyed at the container surface with the appropriate survey 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.
- C. 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.
16. Experimental animals, or the products from experimental animals, that have been administered licensed materials shall not be used for human consumption.

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17. The licensee may transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."
18. This license does not authorize commercial distribution of licensed material.
19. Licensed material shall not be used in or on human beings or in field applications where activity is released except as provided otherwise by specific condition of this license.
20. In addition to the possession limits in Item 8, the licensee shall further restrict the possession of licensed material to quantities below the limits specified in 10 CFR 30.72 which require consideration of the need for an emergency plan for responding to a release of licensed material.
21. Except for plutonium contained in a medical device designed for individual human application, no plutonium, regardless of form, shall be delivered to a carrier for shipment by air transport or transported in an aircraft by the licensee except in packages the design of which the NRC has specifically approved for transport of plutonium by air.
22. A. Pursuant to 10 CFR 20.1302 and 10 CFR 20.2002, the licensee is authorized to dispose of licensed material by incineration at the Environmental Management Facility provided the gaseous effluent from incineration does not exceed the limits specified for air in Appendix B, Table II, 10 CFR Part 20.
- B. Pursuant to 10 CFR 20.2002, the licensee may dispose of incinerator ash containing radioactive materials with Atomic Nos. 1-83, other than those isotopes listed below, as ordinary waste in a landfill, provided the concentrations of the isotopes, expressed in μCi per gram of ash, at the time of disposal, do not exceed the numerical values listed in Table II, Column 2, 10 CFR 20, Appendix B. Isotopes not included are hydrogen-3, carbon-14, aluminum-26, chlorine-36, silver-108m, niobium-94, iodine-129, technetium-99, and thallium-204, for which the concentrations must not exceed 10 percent of the values listed in Table II, Column 2, 10 CFR Part 20, Appendix B.
23. The licensee shall establish and implement emergency procedures for the use of gas chromatographs at temporary job sites. A copy of these procedures shall accompany every device that is transported to a job site.
24. 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.
25. A. Detector cells containing a titanium tritide foil or a scandium tritide foil shall only be used in conjunction with a properly operating temperature control mechanism which prevents the foil temperature from exceeding that specified by the manufacturer and approved by NRC.
- B. When in use, detector cells containing a titanium tritide foil or a scandium tritide foil shall be vented to the outside.

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26. When performing tests at temporary job sites, the authorized user shall not leave the moisture/density gauge unattended. Upon completion of tests the device shall be locked in the licensee's vehicle or a secure building to prevent unauthorized use, loss, or theft.
27. Except as otherwise specified in this license, the licensee shall have available and follow the instructions contained in the manufacturer's instruction manual for the chromatography device.
28. 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, storage, or when not under the direct surveillance of an authorized user.
29. Any cleaning, maintenance, or repair of the gauge(s) that requires removal of the source rod shall be performed only by the manufacturer or by other persons specifically licensed by the Commission or an Agreement State to perform such services.
30. 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 Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than regulations.
- A. Application dated February 28, 2002;
- B. Letters dated July 15, 1993, August 11, 1993 (with enclosure), April 27, 2004 (with enclosure) and January 10, 2005, April 30, 2008, June 30, 2008, July 28, 2008 and;
- C. Facsimile dated June 3, 2002.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date SEP 09 2008

By


Kevin G. Null
Materials Licensing Branch
Region III