

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. Van Andel Research Institute		In accordance with letter dated Novemebr 3, 2016,	4. Expiration Date: December 31, 2022
2. 333 Bostwick Avenue, NE Grand Rapids, MI 49503		3. License number: 21-32841-01 is amended in its entirety to read as follows:	5. Docket No.: 030-38554 Reference No.:
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
A. Hydrogen-3	A. Any	A. 100 millicuries total	A. For research and development as defined in 10 CFR 30.4, including animal studies.
B. Carbon-14	B. Any	B. 60 millicuries total	B. For research and development as defined in 10 CFR 30.4, including animal studies.
C. Phosphorus-32	C. Any	C. 100 millicuries total	C. For research and development as defined in 10 CFR 30.4, including animal studies.
D. Phosphorus-33	D. Any	D. 100 millicuries total	D. For research and development as defined in 10 CFR 30.4, including animal studies.
E. Sulfur-35	E. Any	E. 100 millicuries total	E. For research and development as defined in 10 CFR 30.4, including animal studies.

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SUPPLEMENTARY SHEET**

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21-32841-01

Docket or Reference Number
030-38554

Amendment No. 7

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
F. Technetium-99m	F. Any	F. 60 millicuries total	F. For research and development as defined in 10 CFR 30.4, including animal studies.
G. Iodine-123	G. Any	G. 60 millicuries total	G. For research and development as defined in 10 CFR 30.4, including animal studies.
H. Iodine-125	H. Any	H. 300 millicuries total	H. For research and development as defined in 10 CFR 30.4, including animal studies.
I. Thallium-201	I. Any	I. 60 millicuries total	I. For research and development as defined in 10 CFR 30.4, including animal studies.
J. Indium-111	J. Any	J. 200 millicuries total	J. For research and development as defined in 10 CFR 30.4, including animal studies.
K. Fluorine-18	K. Any	K. 50 millicuries total	K. For research and development as defined in 10 CFR 30.4, including animal studies.
L. Copper-64	L. Any	L. 100 millicuries total	L. For research and development as defined in 10 CFR 30.4, including animal studies.
M. Iodine-124	M. Any	M. 44 millicuries total	M. For research and development as defined in 10 CFR 30.4, including animal studies.
N. Yttrium-86	N. Any	N. 31 millicuries total	N. For research and development as defined in 10 CFR 30.4, including animal studies.

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

O. Zirconium-89

P. Rhenium-186

Q. Gold-198

R. Lutetium-177

7. Chemical and/or physical form

O. Any

P. Any

Q. Any

R. Any

8. Maximum amount that licensee
may possess at any one time
under this license

O. 31 millicuries total

P. 42 millicuries total

Q. 37 millicuries total

R. 58 millicuries total

9. Authorized use

O. For research and development as
defined in 10 CFR 30.4, including
animal studies.

P. For research and development as
defined in 10 CFR 30.4, including
animal studies.

Q. For research and development as
defined in 10 CFR 30.4, including
animal studies.

R. For research and development as
defined in 10 CFR 30.4, including
animal studies.

CONDITIONS

10. Licensed material may be used or stored at the licensee's facilities located at 333 Bostwick Avenue, NE, Grand Rapids, Michigan.
11. The Radiation Safety Officer (RSO) for this license is David W. Lutkenhoff, M.S., CIH, CIEC.
12. Licensed material shall only be used by, or under the supervision of, the following individuals for the materials and uses indicated:

Authorized User(M.D.,D.O.,etc.)

Arthur S. Alberts, Ph.D.

Nicholas S. Duesbery, Ph.D.

Karsten Melcher, Ph.D.

Jeffrey P. MacKeigan, Ph.D.

Material and Use

Phosphorus-32, phosphorus-33 and sulfur-35

Hydrogen-3, carbon-14, phosphorus-32, phosphorus-33, iodine-125, and sulfur-35

Hydrogen-3, phosphorus-32, phosphorus-33, and sulfur-35

Hydrogen-3, phosphorus-32, phosphorus-33, and sulfur-35

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Authorized User(M.D.,D.O.,etc.)

Alison Bernstein, Ph.D.
Steven J. Triezenberg, Ph.D.
Ning Wu, Ph.D.
Bart O. Williams, Ph.D.
Eric H. Xu, Ph.D.
Scott Edward Counts, Ph.D.
Darren Moore, Ph.D.
Piroska E. Szabo, Ph.D.
Scott B. Rothbart, Ph.D.
Anderson S. Peck, M.S.

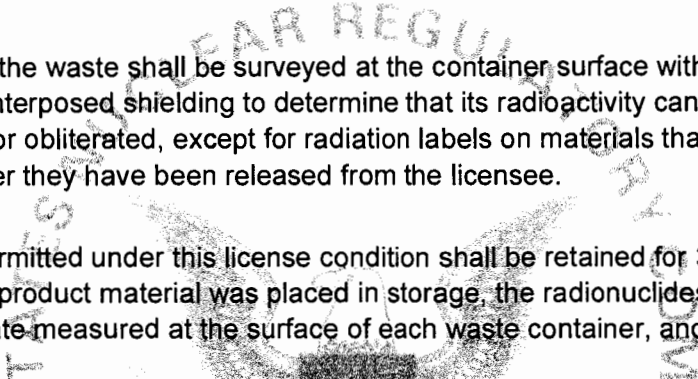
Material and Use

Hydrogen-3
Hydrogen-3, carbon-14, phosphorus-32, phosphorus-33, iodine-125, and sulfur-35
Hydrogen-3 and phosphorus-32
Phosphorus-32 and sulfur-35
Hydrogen-3, phosphorus-32, phosphorus-33, iodine-125, and sulfur-35
Phosphorus-33
Phosphorus-32, phosphorus-33, and sulfur-35
Phosphorus-32
Hydrogen-3, phosphorus-32, phosphorus-33, and carbon-14
Technetium-99m, iodine-123, iodine-125, thallium-201, indium-111, fluorine-18, copper-64, iodine-124, yttrium-86, zirconium-89, rhenium-186, gold-198, and lutetium-177

13. The licensee shall not use the licensed material in or on humans.
14. The licensee shall not use licensed material in field applications where activity is released except as provided otherwise by specific condition of this license.
15. Experimental animals, or the products from experimental animals, that have been administered licensed material shall not be used for human consumption.

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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, 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, except for radiation labels on materials that are within containers and that will be managed as biomedical waste after they have been released from the licensee.
 - B. A record of each such disposal permitted under this license condition shall be retained for 3 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.
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17. 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 January 31, 2012 (ML120330295)
 - B. Letter dated June 20, 2012 (ML13009A149)
 - C. Letter dated October 23, 2012 (ML12299A497)
 - D. Letter dated April 25, 2014 (re: lab diagrams) (ML14118A474)
 - E. Letter dated March 6, 2015 (ML15068A286)
 - F. Letter dated March 12, 2015 (including Delegation of Authority Memorandum dated March 11, 2015) (ML15075A099)
 - G. Letter dated May 27, 2015 (ML15152A212)
 - H. Letter dated November 12, 2015 (ML15335A491)
 - I. Letter dated February 5, 2016 (ML16039A281)
 - J. Letter dated June 17, 2016 (ML16169A312)
 - K. Letter dated November 3, 2016 (ML16313A104)
 - L. Letter dated November 10, 2016 (ML16320A222)

Date: JAN 24 2017

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

By: Cassandra F. Frazier
Region III