U.S. NUCLEAR REGULATORY COMMISSION

Amendment No. 8

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	In accordance with letter dated January 11, 2017,	4. Expiration Date: December 31, 2022
1. Van Andel Research Institute 2. 333 Bostwick Ave., 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. See Item 9.A.
C. Phosphorus-32	C. Any	C. 100 millicuries total	C. See Item 9.A.
D. Phosphorus-33	D. Any	D. 100 millicuries total	D. See Item 9.A.
E. Sulfur-35	E. Any	E. 100 millicuries total	E. See Item 9.A.
F. Technetium-99m	F. Any	F. 60 millicuries total	F. See Item 9.A.
G. Iodine-123	G. Any	G. 60 millicuries total	G. See Item 9.A.
H. Iodine-125	H. Any	H. 300 millicuries total	H. See Item 9.A.

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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
I. Thallium-201	I. Any	I. 60 millicuries total	I. See Item 9.A.
J. Indium-111	J. Any	J. 200 millicuries total	J. See Item 9.A.
K. Fluorine-18	K. Any	K. 50 millicuries total	K. See Item 9.A.
L. Copper-64	L. Any	L. 100 millicuries total	L. See Item 9.A.
M. Iodine-124	M. Any	M. 44 millicuries total	M. See Item 9.A.
N. Yttrium-86	N. Any	N. 31 millicuries total	N. See Item 9.A.
O. Zirconium-89	O. Any	O. 31 millicuries total	O. See Item 9.A.
P. Rhenium-186	P. Any	P. 42 millicuries total	P. See Item 9.A.
Q. Gold-198	Q. Any	Q. 37 millicuries total	Q. See Item 9.A.
R. Lutetium-177	R. Any	R. 58 millicuries total	R. See Item 9.A.

CONDITIONS

10. Licensed material shall be used or stored only 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 materials shall only be used by, or under the supervision of, the following individuals for the materials and uses indicated:

Non-Medical Use	Material and Use
Karsten Melcher, Ph.D.	Hydrogen-3, phosphorus-32, phosphorus-33, and sulfur-35

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Non-Medical Use	Material and Use
Jeffrey P. MacKeigan, Ph.D.	Hydrogen-3, phosphorus-32, phosphorus-33, and sulfur-35
Steven J. Triezenberg, Ph.D.	Hydrogen-3, carbon-14, phosphorus-32, phosphorus-33, iodine-125, and sulfur-35
Ning Wu, Ph.D.	Hydrogen-3 and phosphorus-32
Bart O. Williams, Ph.D.	Phosphorus-32 and sulfur-35
Eric H. Xu, Ph.D.	Hydrogen-3, phosphorus-32, phosphorus-33, iodine-125, and sulfur-35
Scott Edward Counts, Ph.D.	Phosphorus-33
Darren Moore, Ph.D.	Phosphorus-32, phosphorus-33, and sulfur-35
Piroska E. Szabo, Ph.D.	Phosphorus-32
Scott B. Rothbart, Ph.D.	Hydrogen-3, phosphorus-32, phosphorus-33, and carbon-14
Anderson S. Peck, M.S.	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
Alison Bernstein, Ph.D.	Hydrogen-3

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.

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:

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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.

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 (ML12174A400)
    C. Letter dated October 23, 2012 (ML12299A497)
    D. Letter dated April 25, 2014 (re: lab diagrams) (ML14118A474)
    E. Letter dated March 6, 2015 (ML15068A286)

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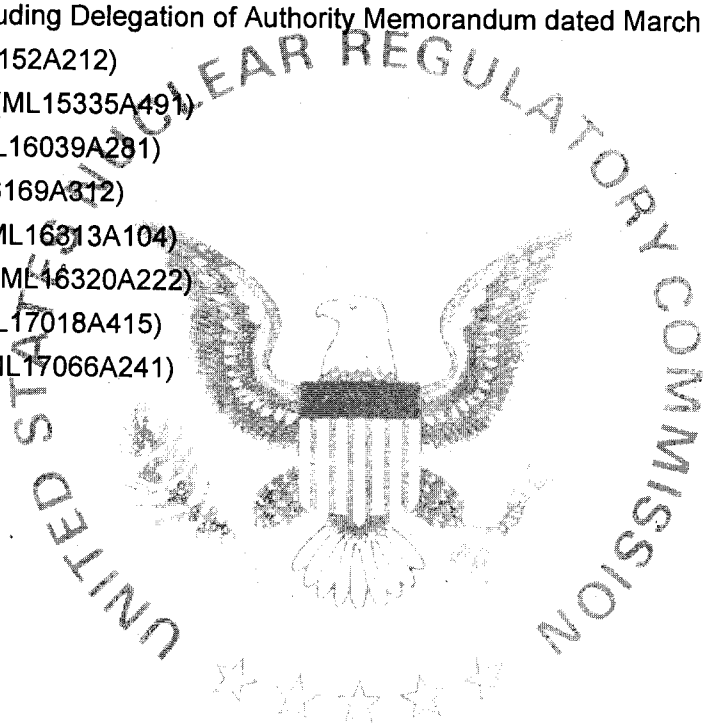
F. Letter dated March 12, 2015 (including Delegation of Authority Memorandum dated March 11, 2015) (ML15075A099)
G. Letter dated May 27, 2015 (ML15152A212)
H. Letter dated November 12, 2015 (ML15335A491)
I. Letter dated February 5, 2016 (ML16039A281)
J. Letter dated June 17, 2016 (ML16169A312)
K. Letter dated November 3, 2016 (ML16313A104)
L. Letter dated November 10, 2016 (ML16320A222)
M. Letter dated January 11, 2017 (ML17018A415)
N. Letter dated February 28, 2017 (ML17066A241)



FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date: APR 18 2017

By: _____
Cassandra F. Frazier
Region III