U.S. NUCLEAR REGULATORY COMMISSION

Amendment No. 20

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 application dated March 27, 2018.	4. Expiration Date: April 30, 2021
1. Mid-America Isotopes, Inc. 2. 706 E. Liberty Ln. Ashland, MO 65010	3. License number: 24-26241-01MD is amended in its entirety to read as follows:	5. Docket No.: 030-31896 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. Molybdenum-99	A. Any	A. 90 curies total	A. Preparation and distribution of radioactive drugs, including compounding of iodine-131 and redistribution of used and unused molybdenum-99/technetium-99m generators, to authorized recipients in accordance with 10 CFR 32.72. Preparation and distribution of radioactive drugs and radiochemicals, including compounding of iodine-131 and redistribution of used and unused molybdenum-99/technetium-99m generators, to authorized recipients for non-medical use.
B. Technetium-99m	B. Any	B. 90 curies total	B. Same as Item 9.A.
C. Iodine-131	C. Any	C. 1.99 curies total	C. Same as Item 9.A.

MATERIALS LICENSE SUPPLEMENTARY SHEET

License Number: 24-26241-01MD
Amendment No. 20
Docket or Reference Number: 030-31896

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D. Xenon-133	D. Any	D. 2 curies total	D. Same as Item 9.A.
E. Any byproduct material with Atomic Numbers 1 through 83 with Exceptions	E. Any	E. 1.5 curies per source and 2 curies total	E. Same as Item 9.A.
F. Any byproduct material permitted by 10 CFR 31.11	F. Prepackaged Kits	F. 60 millicuries total	F. Redistribution to specific licensees or general licensees pursuant to 10 CFR 31.11, provided the packaging and labeling remain unchanged.
G. Any byproduct material authorized under 10 CFR 35.65	G. Sealed Sources	G. 60 millicuries total	G. Calibration and checking of the licensee's own instruments. Redistribution of sealed sources initially distributed by a manufacturer licensed pursuant to 10 CFR 32.74 to authorized recipients and to authorized recipients for non-medical use.
H. Any byproduct material permitted in 10 CFR 35.400	H. Sealed Sources	H. 500 millicuries total	H. Redistribution of sealed sources initially distributed by a manufacturer licensed pursuant to 10 CFR 32.74. Redistribution of sealed sources that have been registered either with NRC 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 sources.

MATERIALS LICENSE SUPPLEMENTARY SHEET

License Number: 24-26241-01MD
Amendment No. 20
Docket or Reference Number: 030-31896

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I. Any byproduct material permitted by 10 CFR 35.500	I. Sealed Sources	I. 5.5 curies total	I. Same as Item 9.H.
J. Uranium- depleted in Uranium-235	J. Metal	J. 201 kilograms total	J. Shielding for molybdenum-99/technetium-99m generators.
K. Molybdenum-99	K. Liquid NorthStar molybdenum-99 to be used in the RadioGenix™ System	K. 7.5 curies per source vessel, not to exceed 30 curies total	K. For use of the NorthStar RadioGenix™ System Model RGX 1.1 for preparation and distribution of radioactive drugs and radiochemicals for medical use in accordance with 10 CFR 32.72 and for non-medical use to authorized recipients.

CONDITIONS

10. Licensed material may be used or stored at the licensee's facilities located at 706 E. Liberty Ln., Ashland, Missouri, 65010.

11. The Radiation Safety Officer (RSO) for this license is Jon W. Woodward, R.Ph.

12. Licensed material shall only be used by, or under the supervision of:

A. A pharmacist working or designated as an authorized nuclear pharmacist in accordance with 10 CFR 32.72(b)(2)(i) and (4); or,

B. Authorized Nuclear Pharmacists for all licensed material except Item 6.K.:

Andrew N. Borrock, Pharm.D., R.Ph. Scott C. Brower, R.Ph. Bynum L. Kimmons, R.Ph.

MATERIALS LICENSE SUPPLEMENTARY SHEET	License Number 24-26241-01MD	Docket or Reference Number 030-31896
	Amendment No. 20	

William C. McHugh, Ph.D., R.Ph. William Brent McHugh, Pharm.D., R.Ph. Glen Palmer, R.Ph.
Marc D. Weichelt, R.Ph. Jon W. Woodward, R.Ph.

C. William Brent McHugh, Pharm.D., R.Ph. for the elution of Tc-99m from the RadioGenix™ System.

13. A. Sealed sources and detector cells 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 by an Agreement State. In the absence of a registration certificate, sealed sources shall be tested for leakage and/or contamination at intervals not to exceed six months, or at such other intervals as specified.

B. Not withstanding Paragraph A of this Condition, sealed sources designed to primarily emit alpha particles shall be tested for leakage and/or contamination at intervals not to exceed three months.

C. 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 by 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.

D. 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 or not more than 10 microcuries of alpha-emitting material.

E. 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.

MATERIALS LICENSE SUPPLEMENTARY SHEET	License Number 24-26241-01MD	Docket or Reference Number 030-31896
	Amendment No. 20	

F. The leak test shall be capable of detecting the presence of 185 becquerels (0.005 microcuries) of radioactive material on the test sample. If the test reveals the presence of 185 becquerels (0.005 microcuries) 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.

G. Tests for leakage and/or contamination, including leak test sample collection and analysis, shall be performed by the licensee or other persons specifically licensed by the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services.

H. Records of leak test results shall be kept in units of becquerels (microcuries) and shall be maintained for three years.

14. Sealed sources containing licensed material shall not be opened or sources removed from source holders by the licensee, except as specifically authorized.

15. The licensee shall conduct a physical inventory every six months, or at other intervals approved by the NRC or Agreement State, to account for all sealed sources and/or devices received and possessed under the license. Records of inventories shall be maintained for five years from the date of each inventory, and shall include the quantities and kinds of byproduct material, manufacturer's name and model numbers, location of the sources and/or devices, and the date of the inventory.

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.

MATERIALS LICENSE SUPPLEMENTARY SHEET	License Number 24-26241-01MD Amendment No. 20	Docket or Reference Number 030-31896

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.

17. Except for maintaining labeling as required by 10 CFR Part 20 or 71, the licensee shall obtain authorization from NRC before making any changes in the sealed source, device, or source-device combination that would alter the description or specifications as indicated in the respective Registration Certificates issued either by the Commission pursuant to 10 CFR 32.210 or by an Agreement State.

18. The licensee is authorized to retrieve, receive and dispose of radioactive waste from its customers, limited to radiopharmacy-supplied syringes and vials and their contents.

19. This license does not authorize distribution to persons exempt from licensing.

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. Letter dated October 6, 2010 (ML102850185)
    B. Letter dated April 26, 2011 (ML111160586)
    C. Letter dated March 7, 2014 (ML14066A492)
    D. Letter dated March 25, 2014 (ML14084A573)
    E. Letter dated June 2, 2014 (ML14153A211)
    F. Letter dated January 29, 2016 (ML16034A535)
    G. Letter dated February 10, 2016 (ML16042A253)
    H. Letter dated April 6, 2016 (ML16098A179)

MATERIALS LICENSE SUPPLEMENTARY SHEET	License Number 24-26241-01MD	Docket or Reference Number 030-31896
	Amendment No. 20	

I. Letter dated April 7, 2016 (ML16099A077)
J. Letter dated July 25, 2016 (ML16208A364)
K. Letter dated December 23, 2016 (ML16363A149)
L. Letter dated March 10, 2017 (ML17069A163)
M. Letter dated December 7, 2017 (ML17349A275)
N. Application dated March 27, 2018 (ML18089A270)
O. Letter dated June 18, 2018 (ML18173A036)
P. Letter dated July 18, 2018 (ML18205A625)

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date: November 1, 2018

By: _____
Cassandra F. Frazier
Region 3