



ARIZONA DEPARTMENT OF HEALTH SERVICES  
BUREAU OF RADIATION CONTROL

**RADIOACTIVE MATERIAL LICENSE**

Pursuant to Chapter 4, Title 30, Arizona Revised Statutes, and Title 9, Chapter 7 of the Arizona Administrative Code, and in reliance on statements and representations made to the Department by the licensee, a license is hereby issued authorizing the acquisition, reception, possession, use and transfer of the radioactive material listed in this license for the purposes and at the places specified. This license is subject to all applicable rules and Department orders now or hereafter in effect and to the conditions specified. **In accordance with letter dated July 31, 2020, signed by Stephanie Griffin, Ph.D., License Number 10-024 is hereby amended in its entirety to read as follows: ALL CHANGES ARE IN BOLD**

**LICENSEE**

- 1. **NAME:** Board of Regents d/b/a University of Arizona
- 2. **ADDRESS:** Research Laboratory and Safety Services  
P.O. Box 245101  
Tucson, Arizona 85724-5101
- 3. **a. LICENSE NUMBER:** 10 - 024  
**b. AMENDMENT NO.:** 90
- 4. **EXPIRATION DATE:** April 30, 2025
- 5. **CATEGORY:** A1 - BROAD ACADEMIC

- | 6. <b>Radioactive material (element and mass number)</b>                  | 7. <b>Chemical or physical form</b> | 8. <b>Maximum quantity licensee may possess at any time</b> |
|---|-------------------------------------|---|
| A. Any radioactive material with atomic numbers 3 through 83 inclusively. | A. Any                              | A. 37 GBq each nuclide (1000 millicuries)                   |
| B. Hydrogen-3   | B. Any                              | B. 1.85 TBq (50 curies)                                     |

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- |                     |   |                              |
|---------------------|---|------------------------------|
| E. Cesium-137       | E. As sealed sources in soil moisture/density measurement devices | E. 1.48 GBq (40 millicuries) |
| F. Radium-226       | F. Any  | F. 185 MBq (5 millicuries)   |
| G. Uranium-Natural  | G. Any  | G. 110 kilograms             |
| H. Uranium-Depleted | H. Any  | H. 100 kilograms             |
| I. Americium-241    | I. Any  | I. 37 GBq (1 curie)          |

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J. Americium-241/Beryllium	J. Sealed source in soil moisture/density measurement device	J. 14.8 GBq (400 millicuries)
K. Thorium-Natural	K. Any	K. 2 kilograms
L. Curium-244/Carbon-13	L. Sealed Source (Amersham Corp. Model CLN.PG1) S-212	L. 2.04 GBq (55 millicuries)
M. Any nuclide with atomic number 84 thru 92.	M. Enriched Standard Materials or Standards	M. 555 MBq (15 millicuries) each nuclide
N. Any nuclide with atomic number 93 thru 95	N. Enriched Standard Materials or Standards Redacted For Security	N. 37 MBq (1 millicuries) each nuclide
P. Californium-252	P. Sealed Source (Frontier Technology OH-0298-S-102-S) Redacted For Security	P. 185 MBq (5 millicuries)
R. Plutonium-239	R. Sealed sources	R. 37 MBq (1 millicurie)

9. **Authorized Use:**

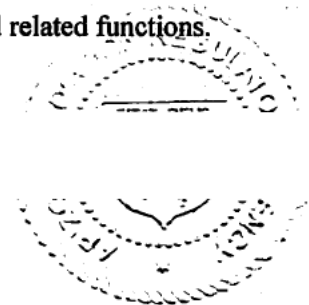
A, B, F, H, I and K through N.

Research and development, as defined in Arizona Administrative Code A.A.C. R9-7-102.  
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E. and J. To be used in approved devices for soil moisture measurements and related functions.

G. To be used as shielding.  
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P. To be used in Frontier Technology Model 100 neutron source.



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R. Research and development, as defined in A.A.C. R9-7-102.

**CONDITIONS**

10. A. Radioactive material may be used and/or stored at the following University of Arizona locations:
1. Radioactive material listed under sub items A through R of Items 6, 7 and 8 may be used and stored at Tucson Campus, 1717 East Speedway Boulevard, Tucson, Arizona 85719.
  2. Radioactive material listed under sub items A and B of Items 6, 7 and 8 may be used and stored at Phoenix Biomedical Campus, 475 North 5<sup>th</sup> Street, Phoenix, Arizona 85004.
  3. Radioactive material listed under sub item A of Items 6, 7 and 8 may be used and stored at Imaging Technology Laboratory, 325 South Euclid Avenue, Suite 117, Tucson, Arizona 85719.
  4. Radioactive material listed under sub item K of Items 6, 7 and 8 may be used and stored at Safford Agricultural Research Center, 2134 South Montierth Lane, Safford, Arizona 85546.
  5. Radioactive material listed under sub items A, B and K of Items 6, 7 and 8 may be used and stored at Campus Agricultural Center – West, 4101 North Campbell Avenue, Tucson, Arizona 85719.
  6. Radioactive material listed under sub item A of Items 6, 7 and 8 may be used and stored at Biosphere 2, 32540 South Biosphere Road, Oracle, Arizona 85623.
11. The licensee shall comply with the provisions of Title 9, Chapter 7, Arizona Administrative Code; Article 3, "Radioactive Material Licensing"; Article 4, "Standards for Protection Against Ionizing Radiation"; and Article 10, "Notices, Instructions and Reports to Radiation Workers; Inspections".
12. A. Radioactive material described above shall be used by, or under the supervision of, individuals approved by the University Radiation Safety Committee (U.R.S.C.).
- B. The Radiation Safety Officer is: **Leon Harris**.
13. The licensee shall request approval from the Department to open sealed sources containing radioactive materials on a case by case basis.
14. The licensee shall not use radioactive material in or on human beings, or in products distributed to the public, or in field applications where activity is released.
15. A. Authority to dispose of radioactive waste by burial at the disposal site on the Page Trowbridge Ranch is prohibited.

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- B. The Page-Trowbridge Ranch groundwater monitoring plan shall adhere to the amended plan submitted October 28, 2008.
16. The licensee may transport radioactive material or deliver material to a carrier for transport in accordance with the provisions of Title 9, Chapter 7, Article 15.
17. A. The licensee shall ensure, in accordance with A.A.C. R9-7-419(C), that an individual participates in a radioiodine bioassay if the individual:
1. Is likely to receive an annual intake in excess 0.1 of the Annual Limits of Intake (ALI) specified in Table 1, Columns 1 and 2 of Appendix B in 9 A.A.C. 7, Article 4;
  2. Is a minor or declared pregnant woman likely to receive an annual committed effective dose equivalent in excess of 50 mRem, or
  3. Has been involved in a spill, an incident, or other occurrence during which radioiodine may have been taken into the body either by inhalation, ingestion, or by absorption through the skin or a wound.
- B. The licensee shall ensure that an individual who is directly involved in a radioiodine therapy, the handling of radioiodine stock solutions, or is involved in iodination's, and meets, as a minimum, any one of the three criteria in Part A above, participates in a bioassay between 6 and 72 hours following the exposure to radioiodine. With Department approval, the licensee may perform I-131 bioassays up to 4 weeks and I-125 bioassays up to 12 weeks following radioiodine exposure.
- C. For any individual whose cumulative annual intake is likely to exceed 0.1 ALI, the licensee shall perform a dosimetric determination based on the results of the bioassay performed under Part B. To assist in determining the total dose equivalent for the individual, the licensee shall add the obtained dose information to the committed dose equivalent information for the exposed individual. For the exposed individual whose bioassay exceeds 0.25 ALI, the licensee shall restrict the exposed individual from further radioiodine exposure until a bioassay indicates the individual's exposure has dropped below 0.1 ALI.
- D. For bioassays exceeding 0.1 ALI, the licensee shall investigate the circumstances surrounding the exposed individual's uptake. Records of the investigation and all bioassay measurements shall be maintained as part of the licensee's personnel dosimetry records and shall be available for inspection by the Department.
18. A. The licensee shall, in accordance with A.A.C. R9-7-419(C), require an individual to participate in a Hydrogen-3 bioassay (urinalysis) whenever the individual is likely to receive, in one year, an intake in excess of 0.1 of the Annual Limits of Intake (ALI) specified in Table 1, Columns 1 and 2 of Appendix B in 9 A.A.C. 7, Article 4.
- B. The licensee shall initiate an individual's bioassay following any operation involving, at any one time, more than 100 millicuries of Hydrogen-3 in a non-contained form, other than metallic foil. The bioassay shall be performed within one week following a single operation and at weekly intervals for continuing operations. If the average concentration for the individual is less than 10  $\mu\text{Ci/liter}$  for a calendar quarter, the bioassay rate may be reduced to monthly intervals.
- C. Before an individual initiates work with Hydrogen-3, the licensee shall require the individual participate in a baseline bioassay if the individual is to work with more than 100 millicuries of Hydrogen-3.

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- D. For any individual whose cumulative annual intake is likely to exceed 0.1 ALI, the licensee shall perform a dosimetric determination based on the results of the bioassay performed under Part A. To assist in determining the total dose equivalent for the individual, the licensee shall add the obtained dose information to the committed dose equivalent for the exposed individual.
- E. The licensee shall ensure occupationally exposed minors and declared pregnant women are monitored for hydrogen-3 intake, if they are likely to receive in one year, a committed effective dose equivalent in excess of 0.01 ALI.
- F. For bioassays exceeding 0.1 ALI, the licensee shall investigate the circumstances surrounding the exposed individual's uptake. Records of the investigation and all bioassay measurements shall be maintained as part of the licensee's personnel dosimetry records and shall be available for inspection by the Department.
19. Experimental animals administered radioactive materials or their products shall not be used for human consumption.
20. 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.  
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22. A. This license does not authorize survey meter calibration as a service to others.
- B. The licensee is authorized to perform laboratory analysis for other licensees and shall be in accordance with the procedures described in 10(D) of Application dated August 23, 2013.
23. The licensee shall not use moisture/density gauges with a downhole probe at depths greater than 20 feet except upon specific authorization by the University Radiation Safety Committee. The Committee may authorize use at greater depths when the Approval Holder has committed to special circumstances that should greatly minimize difficulty in probe retrieval. These circumstances shall include such measures as casing the hole the entire depth with a casing of acceptable inside diameter, lowering and retrieval of a dummy probe before each use, or use of a secondary cable attached to the probe.
24. A. The licensee shall review the decommissioning and funding plan submitted to the Department in letter dated November 13, 2019, on an annual basis to ensure that adequate funds are available for disposal of all radioactive material and to complete the termination of this license.
- B. A record of the cost estimate performed for determining the decommissioning and funding plan shall be maintained for Department review.
- C. The decommissioning and funding plan and certificate of financial assurance shall be maintained until all radioactive material has been disposed of and the license is terminated.
25. The licensee is exempt from the requirements in A.A.C. R9-7-433(F) in regards to physical surveys of sealed sources containing less than 50 millicuries, as requested in letter dated August 23, 2013.

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28. The licensee shall submit to the Department a list of all radioactive use/storage locations on an annual basis.  
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33. For purposes of ending the principal activities authorized under this radioactive material license:
- A. The license stays in effect beyond the license expiration date. Beyond the expiration date the licensee shall store radioactive material only, until the Department authorizes its use by license amendment, or the Department notifies the licensee in writing that the license is terminated.
  - B. The licensee shall ensure the timeliness of decommissioning of facilities where principal activities are conducted under this license in accordance with Department requirements.
  - C. The licensee shall continue to control public access into restricted areas and pay the annual licensing fee until the license is terminated.
34. Except as specifically provided otherwise by this license, the licensee shall possess and use the radioactive material described in Items 6, 7 and 8 of this license in accordance with the statements, representations and procedures contained in:
- 1. Application with attachments dated November 14, 2019, signed by Keith Carsten, M.S.
  - 2. Letter dated May 27, 2020, signed by Keith Carsten, M.S.
  - 3. Letter with attachments dated July 31, 2020, signed by Stephanie Griffin, Ph.D.

The most recent statements, representations, and procedures shall govern if they conflict with previously submitted documents, unless otherwise specified by a license condition; and the Department's rules shall govern the licensee's statements in applications or letters.

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BRIAN D. GORETZKI, BUREAU CHIEF



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COLBY BOWER, ASSISTANT DIRECTOR

DATE ISSUED: **SEP 16 2020**  
PRK:BDG:mjk