

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, 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. Tennessee Valley Authority Energy Research & Technology Applications</p> <p>2. P. O. Box 1010</p> <p>Muscle Shoals, Alabama 35662-1010</p>	<p style="text-align: center;">In accordance with the letter dated February 14, 2000</p> <p>3. License No. 41-25370-01 is amended in its entirety to read as follows:</p> <hr/> <p>4. Expiration date: October 31, 2001</p> <hr/> <p>5. Docket No. 030-34258 (01-06113-03)</p>
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<p>6. Byproduct, source, and/or special nuclear material</p> <p>A. Carbon 14</p> <p>B. Phosphorus 32</p> <p>C. Phosphorus 33</p> <p>D. Sulfur 35</p> <p>E. Calcium 45</p> <p>F. Nickel 63</p> <p>G. Cesium 137</p> <p>H. Mixed fission/activation products</p>	<p>7. Chemical and/or physical form</p> <p>A. Any</p> <p>B. Any</p> <p>C. Any</p> <p>D. Any</p> <p>E. Any</p> <p>F. Any foil or plated source contained in a compatible detector cell registered pursuant to 10 CFR 32.210 or an equivalent Agreement State regulation</p> <p>G. Any sealed source registered pursuant to 10 CFR 32.210 or an equivalent Agreement State regulation</p> <p>H. Mixed fission/activation products</p>	<p>8. Maximum amount that licensee may possess at any one time under this license</p> <p>A. 2.59 gigabecquerels (GBq) (70 millicuries)</p> <p>B. 111 GBq (3 curies)</p> <p>C. 37 GBq (1 curie)</p> <p>D. 55.5 GBq (1.5 curies)</p> <p>E. 3.5 GBq (75 millicuries)</p> <p>F. Not to exceed 0.74 GBq per source (20 millicuries)</p> <p>G. Not to exceed 4.55 GBq per source (150 millicuries)</p> <p>H. 37 megabecquerels (1 millicurie)</p>
<p>9. Authorized Use:</p> <p>A. For research and development as defined in 10 CFR 30.4.</p> <p>B. through E. For use in tagging of fertilizers, fertilizer components, and other materials and for transfer to authorized recipients, and for use as in 9.A. above.</p>		

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- F. For use in a compatible gas chromatograph for sample analysis.
- G. Sealed sources contained in non-portable gauging devices which have been registered pursuant to 10 CFR 32.210 and distributed in accordance with an NRC or Agreement State License for the purpose of measuring properties of materials and/or controlling industrial processes.
- H. Physical and chemical characterization of the non-radioactive component of solid and liquid samples using laboratory instruments.

CONDITIONS**10. Locations of use:**

- A. Licensed material identified in Items 6.A. shall be used only at the licensee's facilities located at:
- (1) Resource Group, Muscle Shoals, Alabama, in laboratories designated by the licensee in accordance with the application dated September 30, 1993;
 - (2) licensed material may be used and stored at the Hickory Valley Building, 283 Hickory Valley Road, Chattanooga, Tennessee; and,
 - (3) may be used at temporary jobsites of the licensee anywhere in the United States.
- B. Licensed material identified in Items 6.B. through 6.E. shall be used only at the licensee's facilities located at the Resource Group, Muscle Shoals, Alabama 35660.
- C. Licensed material identified in Item 6.F. shall be used at the licensee's facilities located at:
- (1) Resource Group, and the Atmospheric Science Department, Water Management, Muscle Shoals, Alabama;
 - (2) Environmental Chemistry Laboratory, Fourth and Chestnut Street, Chattanooga, Tennessee; and,
 - (3) temporary jobsites of the licensee anywhere in the United States.
10. D. Licensed material identified in Item 6.G. shall be used only at the licensee's facilities located at the Resource Group, Muscle Shoals, Alabama 35660.
- E. Licensed material identified in Item 6.H. shall be used only at the licensee's facilities located at the Resource Group, Muscle Shoals, Alabama and at temporary jobsites anywhere in United States.
- F. Licensed material identified in Item 6.H. shall be used at the licensee's facilities located at the Resource Group, Muscle Shoals, Alabama 35660, and at temporary job sites of the licensee anywhere in the United States.

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- 11. The Radiation Protection Officer for the activities authorized by this license is Floyd J. Spivey, Jr., or in his absence, James A. Flanigan, Alternate Radiation Protection Officer.**
12. Authorized user(s):
- A. Licensed material identified in Item 6.A. shall be used by or under the supervision of, Wayne L. Poppe, Ph.D., or individuals who meet the specifications of 10 CFR 33.15(b)(1) and (2), or individuals who have been trained as specified in application dated September 30, 1993. The licensee shall maintain records of individuals designated as users.
 - B. Licensed material identified in Items 6.B through 6.E. shall be used by or under the supervision of individuals who have been trained as specified in the application dated September 30, 1993. The licensee shall maintain records of individuals designated as users.
 - C. Licensed material identified in Item 6.F. shall be used by or under the supervision of, Dr. C. Henry Copeland, Kenneth J. Olszyna, Larry O. Hill, or individuals who have been trained as specified in application dated September 30, 1993. The licensee shall maintain records of individuals designated as users.
 - D. Licensed material identified in Item 6.G. shall be used by or under the supervision of, Millicent M. Bulls or individuals who have been trained as specified in application dated September 30, 1993. The licensee shall maintain records of individuals designated as users.
 - E. Licensed materials identified in Item 6.H. shall be used by, or under the supervision of Dr. William J. Rogers or Dr. C. Henry Copeland
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. 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.
13. C. 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
 - (iv) they contain not more than 3.7 megabecquerels (MBq) (100 microcuries) of beta and/or gamma emitting material or not more than 0.37 MBq (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

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sealed source or detector cell shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.

- D. The leak test shall be capable of detecting the presence of 185 becquerels (Bq) (0.005 microcurie) of radioactive material on the test sample. If the test reveals the presence of 185 Bq 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 II, ATTN: Chief, Materials Licensing/Inspection Branch, Division of Nuclear Materials Safety, 61 Forsyth Street SW, Suite 23T85, Atlanta, GA 30303-8931. The report shall specify the source involved, the test results and corrective action taken.
- E. 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. A. Each gauge authorized by Item 9.G. shall be tested for the proper operation of the on-off mechanism and indicator, if any, upon installation and at intervals not to exceed six months or at such longer intervals as specified by the device manufacturer, not to exceed three years, and at the same interval as the leak test specified in Condition 13.A.
- B. Installation, initial radiation survey, relocation, or removal from service of devices containing sealed sources authorized by Item 7.G. shall be performed by or under the supervision and physical presence of licensee personnel of Radiation Safety in accordance with the procedures in the application dated September 30, 1992 and the letter dated March 28, 1994 or by persons specifically licensed by the Commission or an Agreement State to perform such services. Maintenance and repair of devices and installation, replacement, and disposal of sealed sources shall be performed only by persons specifically licensed by the Commission or an Agreement State to perform such services.

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14. C. Prior to initial use and after installation, relocation, dismantling, alignment, or any other activity involving the source or removal of the shielding, the licensee shall assure that a radiological survey is performed to determine radiation levels in accessible areas around, above and below the gauge with the shutter open.
- D. The licensee shall operate each gauge within the manufacturer's specified temperature and/or environmental limits such that the shielding and shutter mechanism of the source holder are not compromised.
- E. The licensee shall assure that the shutter mechanism is locked in the closed position during periods when a portion of an individual's body may be subject to the direct radiation beam. The licensee shall review and modify as appropriate its "lock-out" procedures whenever a new gauge is obtained to incorporate the device manufacturer's recommendations.
15. A. This license does not authorize commercial distribution of licensed material
- B. Licensed material shall not be used in or on human beings or in products distributed to the public.
- C. The licensee shall not use licensed material in field applications where activity is released except as provided otherwise by specific condition of this license.
16. A. Sealed sources containing licensed material shall not be opened by the licensee.
- B. Detector cells containing licensed material shall not be opened or the sources removed from the detector cell by the licensee.
17. The licensee shall conduct a physical inventory every 6 months to account for all sources and/or devices received and possessed under this license.
18. The licensee may transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."
19. The licensee is authorized to hold radioactive material with a physical half-life of 90 days or less 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 normal waste, radioactive waste shall be surveyed at the container surface with the appropriate 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.

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19. 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.
- D. Waste materials with a half-life exceeding 65 days shall be segregated from waste with half-lives less than or equal to 65 days.
- E. Waste materials with half-lives more than 65 days shall be packaged such that the waste form is compatible with the container.
20. Pursuant to 10 CFR 20.1301 and 20.2002, the licensee is authorized to dispose of liquid phosphorus 32, phosphorus 33, sulfur 35 and calcium 45 by release to a storm sewer provided the liquid effluent from release does not exceed the limits specified for water in Appendix B, Table II, 10 CFR Part 20.
21. In addition to the possession limits in item 8, the licensee shall further restrict the possession of licensed material as follows:
- A. For unsealed sources to quantities less than 10^5 times the applicable limits in Appendix B, 10 CFR 30 as specified in 10 CFR 30.35(d) and
- B. For sealed sources, to quantities less than 10^{10} times the applicable limits in Appendix B, 10 CFR 30 as specified in 10 CFR 30.35(d).
22. This license supersedes License Numbers 01-06113-03, 01-06113-01, 01-06113-02, 41-06832-08, 41-06832-09, and 41-08165-07.

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23. 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 the regulations.

A. Application dated September 30, 1993

B. Letters and attachments dated

1. March 28, 1994 [telefax response to deficiency letter, 2/17/94]
2. January 27, 1995 [Change RSO, qualifications previously submitted]
3. July 12, 1996 [Change official address, add authorization for physical laboratory examination of radioactive materials, add authorized users, add training requirements for same activity]
4. January 21, 1997 [delete C-14 ozone study, Norris TN, researcher, change Ni-63 supervisor, add C-14, P-32, S-35 use at ERC for lab studies]
5. July 22, 1997 [change RSO (and user Cond. 12.F), add Alternate RSO]
6. September 22, 1997 [Organizational changes, user changes, deletes use locations, deletes uses]
7. September 21, 1999 [Organizational change, change RPO and alternate, staff changes, delete departed persons]
8. February 14, 2000 [Appoint new RPO]

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

DAVID J. COLLINS

DATE April 28, 2000

BY /RA/

Region II, Division of Nuclear Materials Safety
61 Forsyth Street, SW, Suite 23T85
Atlanta, GA 30303-8931