



THE COMMONWEALTH OF MASSACHUSETTS
 DEPARTMENT OF PUBLIC HEALTH
 RADIATION CONTROL PROGRAM
 MATERIALS LICENSE

Pursuant to Massachusetts General Laws Chapter 111, Sections 3, 5M, 5N, 5O and 5P and Massachusetts Regulations for the Control of Radiation, Section 120.100, Licensing of Radioactive Material, and in reliance on statements and representation heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer radioactive materials 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 105 CMR 120.000. This license shall be deemed to contain the conditions specified in 105 CMR 120.000 and is subjected to all applicable rules, regulations of the Department of Public Health, Commonwealth of Massachusetts, now or hereafter in effect and to any conditions specified below.

<p style="text-align: center;">Licensee</p> <p>1. AEA Technology QSA, Inc.</p> <p>2. 40 North Avenue Burlington, Massachusetts 01803</p>	<p>3. License Number: 12-8361 is amended in its entirety, in accordance with letter dated August 19, 2003, to read as follows:</p> <p style="text-align: center;">Amendment No: <u>31</u></p> <hr/> <p>4. Expiration Date: May 31, 2005</p> <hr/> <p>5. Docket No: 99-0014</p>
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6. Radioactive Material	7. Chemical/Physical Form	8. Maximum Possession Limit
A. Gadolinium-153	A. Sealed sources and/or neutron activated metal	A. 1,000 curies
B. Selenium-75	B. Sealed sources and/or neutron activated metal	B. 5,000 curies
C. Ytterbium-169	C. Sealed sources and/or neutron activated metal	C. 2,000 curies
D. Ytterbium-175	D. Sealed sources and/or neutron activated metal	D. 400 curies
E. Iridium-192	E. Any	E. 100,000 curies
F. Iridium-192	F. Sealed sources and/or neutron activated metal	F. 150,000 curies
G. Iridium-194	G. Any	G. 2000 curies
H. Iridium-194	H. Sealed sources and/or neutron activated metal	H. 20,000 curies

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6. Radioactive Material	7. Chemical/Physical Form	8. Maximum Possession Limit
I. Americium-241	I. Any	I. 1 millicurie
J. Polonium-210	J. Any	J. 3 curies
K. Lead-210	K. Any	K. 5 millicuries
L. Radium-226	L. Any	L. 100 microcuries
M. Neptunium-237	M. Any	M. 50 microcuries
N. Any non-alpha emitting radioactive material with a half-life less than or equal to 120 days	N. Any	N. 1 millicurie per radionuclide; total possession limit not to exceed 500 millicuries
O. Antimony-125	O. Any	O. 500 microcuries
P. Iron-55	P. Any	P. 20 curies
Q. Barium-133	Q. Any	Q. 1 curie
R. Krypton-85	R. Any	R. 400 curies
S. Cadmium-109	S. Any	S. 10 curies
T. Manganese-54	T. Any	T. 500 microcuries
U. Calcium-45	U. Any	U. 500 microcuries
V. Nickel-63	V. Any	V. 10 curies
W. Carbon-14	W. Any	W. 50 curies
X. Platinum-193	X. Any	X. 500 microcuries
Y. Cerium-139	Y. Any	Y. 500 microcuries
Z. Promethium-147	Z. Any	Z. 2 millicuries

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AA. Cerium-144	AA. Any	AA. 500 microcuries
AB. Gallium-67	AB. Any	AB. 10 millicuries
AC. Cesium-134	AC. Any	AC. 500 microcuries
AD. Silver-110m	AD. Any	AD. 500 microcuries
AE. Cesium-137	AE. Any	AE. 1 curie
AF. Sodium-22	AF. Any	AF. 1 curie
AG. Chlorine-36	AG. Any	AG. 500 microcuries
AH. Strontium-90	AH. Any	AH. 600 microcuries
AI. Hydrogen-3	AI. Any	AI. 100 curies
AJ. Technetium-99	AJ. Any	AJ. 500 microcuries
AK. Cobalt-60	AK. Any	AK. 10 millicuries
AL. Thallium-204	AL. Any	AL. 500 microcuries
AM. Europium-152	AM. Any	AM. 500 microcuries
AN. Thulium-170	AN. Any	AN. 500 microcuries
AO. Iodine-129	AO. Any	AO. 500 microcuries
AP. Zinc-65	AP. Any	AP. 500 microcuries
AQ. Iridium-192m	AQ. Any	AQ. 500 microcuries
AR. Iridium-194m	AR. Any	AR. 500 microcuries
AS. Cobalt-57	AS. Any	AS. 5 curies

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AT. Bismuth-207	AT. Any	AT. 2 millicuries
AU. Cobalt-60	AU. Sealed sources and/or neutron activated metal	AU. 20,000 curies
AV. Strontium-90	AV. Sealed sources and/or neutron activated metal	AV. 50 curies
AW. Cesium-137	AW. Sealed sources and/or neutron activated metal	AW. 2000 Curies
AX. Promethium-147	AX. Sealed sources and/or neutron activated metal	AX. 200 curies
AY. Radium-226	AY. Sealed sources and/or neutron activated metal	AY. 2 curies
AZ. Americium-241	AZ. Sealed sources and/or neutron activated metal	AZ. 1000 curies
BA. Curium-242	BA. Sealed sources and/or neutron activated metal	BA. 100 millicuries
BB. Californium-252	BB. Sealed sources and/or neutron activated metal	BB. 2 curies
BC. Protactinium-233	BC. Any	BC. 2 millicuries
BD. Tin-119	BD. Sealed sources and/or neutron activated metal	BD. 1 curie
BE. Samarium-151	BE. Any	BE. 1 curie
BF. Tantalum-182	BF. Sealed sources and/or neutron activated metal	BF. 1 curie

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BG. Curium-242	BG. Any	BG. 100 millicuries
BH. Polonium-209	BH. Any	BH. 50 microcuries
BI. Niobium-93m	BI. Any	BI. 200 microcuries
BJ. Californium-252	BJ. Any	BJ. 50 microcuries
BK. Protactinium-231	BK. Any	BK. 50 microcuries
BL. Polonium-208	BL. Any	BL. 50 microcuries
BM. Indium-111	BM. Any	BM. 10 millicuries
BN. Phosphorus-32	BN. Any	BN. 5 millicuries
BO. Strontium-89	BO. Any	BO. 10 millicuries
BP. Thallium-201	BP. Any	BP. 10 millicuries
BQ. Xenon-133	BQ. Any	BQ. 100 millicuries
BR. Actinium-227	BR. Any	BR. 10 millicuries
BS. Neptunium-237	BS. Sealed sources and/or neutron activated metal	BS. 20 millicuries
BT. Curium-244	BT. Sealed sources and/or neutron activated metal	BT. 10 curies
BU. Uranium-233	BU. Any	BU. 100 microcuries
BV. Uranium-235	BV. Any	BV. 250 microcuries
BW. Plutonium-236	BW. Any	BW. 100 millicuries
BX. Plutonium-238	BX. Any	BX. 3 millicuries

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BY. Plutonium-239	BY. Any	BY. 2 millicuries
BZ. Plutonium-240	BZ. Any	BZ. 2 millicuries
CA. Plutonium-241	CA. Any	CA. 100 millicuries
CB. Plutonium-242	CB. Any	CB. 3 millicuries
CC. Americium-243	CC. Any	CC. 8 millicuries
CD. Curium-244	CD. Any	CD. 50 microcuries
CE. Radon-222	CE. Any	CE. 10 microcuries
CF. Germanium-68	CF. Any	CF. 300 millicuries
CG. Iodine-125	CG. Any	CG. 1 millicurie
CH. Ruthenium-106	CH. Any	CH. 1 millicurie
CI. Gadolinium-153	CI. Any	CI. 500 microcuries
CJ. Palladium-111	CJ. Any	CJ. 100 curies
CK. Palladium-103	CK. Any	CK. 10 curies
CL. Silver-111	CL. Any	CL. 10 curies
CM. Silver-110m	CM. Any	CM. 500 millicuries
CN. Scandium-46	CN. Sealed sources and/or neutron activated metal	CN. 5000 curies
CO. Yttrium-90	CO. Any	CO. 50 curies
CP. Zinc-65	CP. Sealed sources and/or neutron activated metal	CP. 10 millicuries

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- | 6. Radioactive Material | 7. Chemical/Physical Form | 8. Maximum Possession Limit |
|-------------------------|---|-----------------------------|
| CQ. Iridium-193m | CQ. Sealed sources and/or neutron activated metal | CQ. 150,000 curies |
| CR. Iron-59 | CR. Sealed sources and/or neutron activated metal | CR. 10 millicuries |
9. Authorized use:
- B. through H., AU., CN., and CQ. Possession incident to sealed source fabrication.
 - A. through CI., CN., and CP. through CR. Commercial processing; manufacturing; fabrication of products; repackaging and storage of sources into devices / containers.
 - A. through CI., CN. through CR. Possession, storage and handling incident to distribution to persons authorized to receive the license material pursuant to the terms and conditions of a specific license issued by the Agency, the U.S. Nuclear Regulatory Commission, an Agreement State, or a Licensing State.
 - A. through CI. Determination of the effectiveness of shielding.
 - A. through CI., CN., and CQ. Demonstration of sources and devices.
 - A. through CI., CN., and CQ. Possession incident to servicing, maintenance, repair and/or evaluation of sources/devices containing radioactive material.
 - A. through CI., CN., and CQ. Leak testing of sources and devices as a customer service.
 - A. through CI., CN., and CQ. Source changing for radioisotopic equipment/devices and isotope handling equipment.
 - A. through CI. Instrument calibration as a customer service.

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- A. through H., AU. through BR., CN., and CQ. Emergency source retrieval operations.
- A. through CI., CN., and CQ. Student training and instruction.
- A. through CR. Research and development as defined in 105 CMR 120.005.

CONDITIONS

10. Radioactive materials shall be used at the licensee's facilities located at 40 North Avenue, Burlington, Massachusetts, except that the licensee may demonstrate the following at temporary job sites of the licensee anywhere in the Commonwealth of Massachusetts except areas under exclusive Federal jurisdiction:

Items A. through CI., CN., and CQ., may be used at temporary jobs sites of the licensee for the following:

1. Possession, storage, and handling incident to distribution to persons authorized to receive the licensed material pursuant to the terms and conditions of a specific license issued by the Agency, the U.S. Nuclear Regulatory Commission, an Agreement State, or a Licensing State.
2. Determination of shielding effectiveness.
3. Demonstration of sources/devices.
4. Possession incident to servicing, maintenance, repair and/or evaluation of sources/devices containing radioactive material.
5. Leak testing of sources/devices as a customer service.
6. Source changing for radioisotopic equipment/devices and isotope handling equipment.
7. Instrument calibration as a customer service.
8. Student training and instruction.
9. Research and Development as defined in 105 CMR 120.005.

Items A. through D., F., H., AU. through BB., BD., BF., BS., BT., CN., and CQ. may be used at temporary jobs sites of the licensee for emergency source retrieval operations.

11. This license is subject to an annual fee as determined by the Executive Office for Administration and Finance.

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12. A. Licensed material shall be used by, or under the supervision of, individuals designated in writing by the Radiation Safety Committee.
- B. Installation, removal or servicing of the Amersham Model NI.1 Small Animal Neutron Irradiator shall only be conducted by personnel trained in these procedures by the Radiation Safety Officer or the Regulatory Affairs Manager. The license shall maintain records of individuals authorized to perform these procedures.
- C. The Radiation Safety Officer for this license is Christopher B. Martel, CHP.
13. A. Sealed sources and detector cells containing licensed material shall be tested for leakage and/or contamination at intervals not to exceed six months or at such other intervals as are specified by the certificate of registration referred to in 10 CFR 32.210, not to exceed three years.
- B. Notwithstanding Paragraph A of this Condition, sealed sources designed to 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 six months prior to the transfer, a sealed source or detector cell received from another person shall not be put into use until tested.
- D. Each sealed source fabricated by the licensee shall be inspected and tested for construction defects, leakage, and contamination prior to any use or transfer as a sealed source.
- E. Sealed sources and detector cells 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 100 microcuries of beta and/or gamma emitting material or not more than 10 microcuries of alpha emitting material; or

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- (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 transfer 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 or detector cell shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.
- F. The test shall be capable of detecting the presence of 185 Bq (0.005 microcurie) of radioactive material on the test sample. If the test reveals the presence of 185 Bq (0.005 microcurie) or more of removable contamination, a report shall be filed with the Agency and the source or detector cell shall be removed immediately from service and decontaminated, repaired, or disposed of in accordance with Agency regulations. The report shall be filed within five days of the date the leak test result is known with the Massachusetts Department of Public Health, ATTN: Director, Radiation Control Program, 90 Washington Street, Dorchester, Massachusetts 02121. The report shall specify the source or detector cell involved, the test results, and corrective action taken.
- G. The licensee is authorized to collect leak test samples for analysis by the licensee. Alternatively, tests for leakage and/or contamination may be performed by persons specifically licensed by the Agency, the U.S. Nuclear Regulatory Commission or an Agreement State to perform such services.
14. The licensee shall conduct a physical inventory every six months to account for all sealed sources and devices containing licensed material received and possessed under the license.
15. The licensee is authorized to hold radioactive material with a physical half-life of less than or equal to 75 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.
- 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 radioactive material was placed in storage, the radionuclides disposed, the survey

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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.

16. Pursuant to 105 CMR 120.146, the licensee is not required to submit an emergency plan for responding to a release of radioactive material provided that the licensee limits the amount of unsealed iridium in the hot cell at one time to no more than 6,000 curies.
17. The licensee shall only transport radioactive material or deliver radioactive material to a carrier for transport in accordance with the provisions of 49 CFR Parts 170 through 189, 10 CFR Part 71, and 105 CMR 120.770 "Transportation of Radioactive Material."
18. A. The licensee shall only distribute those sealed sources and/or devices for which a Sealed Source and Device (SS&D) Evaluation Sheet has been issued by the Agency, the U.S. Nuclear Regulatory Commission, an Agreement State, or a Licensing State. Sealed sources and/or devices must be manufactured and/or distributed in accordance with all statements and representations, including the description of the quality assurance program that provided the basis for issuance of the SS&D Evaluation Sheet. Prior to distribution, any changes in the design, production process, specifications of a product, sealed source or device shall be approved by the Agency.
- B. The licensee shall maintain an active and valid (SS&D) Evaluation Sheet for each product, sealed source, or device which it distributes. The licensee may repair, maintain and service products, sealed sources, sealed sources or devices previously distributed which are part of an inactive SS&D evaluation issued to the licensee. However, the licensee may not continue to manufacture or distribute such products, sealed sources or devices if they are inactive.
- C. These requirements shall not apply to the following:
 - (i) Calibration and reference sources not exceeding:
 - a. For beta/gamma emitting material, 100 microcuries or ten times the quantity specified in 105 CMR 120.196: Appendix B, Table I, whichever is greater; or
 - b. For alpha emitting materials, 10 microcuries.

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- (ii) Sealed sources and devices distributed to specific licensees of broad scope.
 - (iii) Sealed sources and devices distributed to licensees authorized for "research and development" as defined in 105 CMR 120.005 provided the licensee is authorized for the radionuclide and quantity in an unsealed or unshielded form.
- D. Sealed sources and devices as described in C(ii) and C(iii) above shall not be subsequently transferred to other licensees, except to licensed waste brokers or licensed disposal facilities.
19. Shipments of radioactive materials in excess of possession limits may be received for the sole purpose of being transferred off-site within 24 hours of receipt. These radioactive materials must contain only isotopes allowed under Item 6 of this license. Said radioactive materials stored on-site for more than 24 hours must be included in licensed inventory.
20. Except as specifically provided otherwise by this license, the licensee shall conduct its program in accordance with statements, representations and procedures contained in the documents, including any enclosures listed below. The Massachusetts Regulations for the Control of Radiation, 105 CMR 120.000, shall govern, unless statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.
- A. U.S. Nuclear Regulatory Commission License Number 20-12836-01, transferred to the Agency on March 21, 1997
 - B. Telefaxed letter May 13, 1997
 - C. Letter dated May 16, 1997
 - D. Telefaxed letter dated May 16, 1997
 - E. Letter dated July 8, 1997
 - F. Telefaxed letter dated August 13, 1997
 - G. Telefaxed letter dated January 27, 1998
 - H. Telefaxed letter dated March 12, 1998
 - I. Letter dated May 6, 1998
 - J. Letter dated May 7, 1998
 - K. Letter dated June 18, 1998
 - L. Letter dated June 30, 1998
 - M. Letter dated July 27, 1998
 - N. Letter dated August 7, 1998
 - O. Letter dated August 13, 1998
 - P. Letter dated September 21, 1998

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- Q. Letter dated December 18, 1998
- R. Letter dated December 23, 1998
- S. Letter dated December 16, 1999
- T. Letter dated January 27, 2000
- U. Letter dated April 7, 2000
- V. Letter dated May 24, 2000
- W. Letter dated August 18, 2000
- X. Letter dated August 22, 2000
- Y. Letter dated May 23, 2001
- Z. Facsimile dated June 7, 2001
- AA. Letter dated March 19, 2002
- BB. Letter dated September 3, 2002
- CC. Letter dated March 17, 2003
- DD. Letter dated August 19, 2003
- EE. Letter dated September 15, 2003

FOR THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC HEALTH
RADIATION CONTROL PROGRAM

Date 09/23/03

By Robert Walker
Robert Walker, Director

