

State of Washington
Radioactive Materials License



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As stated in the Nuclear Energy and Radiation Act, Revised Code of Washington 70.98, and the Radiation Protection Regulations, chapters 246-220 through 246-254 of the Washington Administrative Code, and in reliance on statements and commitments made by the licensee identified below, a license is issued authorizing the licensee to transfer, receive, possess, and use the radioactive material authorized below; and to use such radioactive material for the purpose(s) and at the place(s) authorized below. This license is subject to all applicable rules and regulations issued by the State of Washington Department of Health.

1. Licensee Name: <p style="text-align: center; font-weight: bold;">DADE MOELLER AND ASSOCIATES</p>	3. License Number: WN-L0232-1 (Entirety) Amendment No. 2 Fee Code: 11
2. Address: 1835 Terminal Drive Suite 200 Richland, Washington 99354	4. Expiration Date: <p style="text-align: center;">31 July 2013</p> <hr/> 5. Reference Number(s): 08-08-40; 08-09-41; 08-10-37; 09-09-37; 09-10-03; 09-10-04; 11-01-12.

- | 6. Radioactive Material
(element and mass number). | 7. Chemical and/or Physical
Form. | 8. Maximum quantity licensee may possess at
any one time. |
|---|--------------------------------------|--|
| A. Radioactive material, atomic numbers 3 to 83, except Special Nuclear Material and source material. | A. Liquid and/or Solid. | A. 9.25 kilobecquerels (0.25 microcuries). |
| B. Hydrogen 3. | B. Any. | B. 296 megabecquerels (8 millicuries). |
| C. Natural Uranium (U-238). | C. Liquid and/or Solid. | C. 37 kilobecquerels (1 microcurie). |
| D. Low Enriched Uranium ($\leq 5\%$ U235). | D. Liquid and/or Solid. | D. 37 kilobecquerels (1 microcurie). |
| E. Natural Thorium. | E. Liquid and/or Solid. | E. 22.2 kilobecquerels (0.6 microcurie). |
| F. Natural Radium. | F. Liquid and/or Solid. | F. 37 kilobecquerels (1 microcurie).
(12 microcuries).* |

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|----|--|----|--|----|--|
| G. | Cesium 137. | G. | Electro-plated disk or sealed source manufactured and distributed under the requirements of a specific license and approved for use identified in License Condition 9.G. | G. | No single source to exceed 37 kilobecquerels (1 microcurie).

Total not to exceed 740 kilobecquerels (20 microcuries). |
| H. | Radium 226. | H. | Electro-plated disk or sealed source manufactured and distributed under the requirements of a specific license and approved for use identified in License Condition 9.H. | H. | No single source to exceed 1.11 kilobecquerels 0.03 microcuries

Total not to exceed 12.2 kilobecquerels 0.33 microcuries. |
| I. | Radioactive material, atomic numbers 1 to 93, except Special Nuclear Material and source material. | I. | Any form suitable for transportation under chapter 246-231 WAC or U.S. Department of Transportation Regulations. | I. | As necessary for the uses authorized in Condition 9.I. |
| J. | Hydrogen 3. | J. | Any. | J. | 22.6 terrabecquerels (610 curies). |
| K. | Carbon 14. | K. | Liquid and/or Solid. | K. | 18.5 gigabecquerels (500 millicuries). |
| L. | Cesium 137. | L. | Liquid and/or Solid. | L. | 1.85 gigabecquerels (50 millicuries). |
| M. | Nickel 63. | M. | Liquid and/or Solid. | M. | 3.7 gigabecquerels (100 millicuries). |

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N.	Natural Uranium.	N.	Liquid and/or Solid.	N.	3.7 gigabecquerels (100 millicuries).
O.	Radium 226.	O.	Liquid and/or Solid.	O.	37 gigabecquerels (1 curie).
P.	Natural Thorium.	P.	Liquid and/or Solid.	P.	3.7 gigabecquerels (100 millicuries).
Q.	Americium 241.	Q.	Liquid and/or Solid.	Q.	3.7 megabecquerels (100 microcuries).
R.	Fluorine.	R.	Liquid and/or Solid.	R.	37 gigabecquerels (1 curie).
S.	Molybdenum 99.	S.	Liquid and/or Solid.	S.	3.7 gigabecquerels (100 millicuries).
T.	Iodine 125 and/or Iodine 131.	T.	Liquid and/or Solid.	T.	1.85 megabecquerels (50 microcuries).
U.	Phosphorus 32.	U.	Liquid and/or Solid.	U.	1.85 gigabecquerels (50 millicuries).
V.	Sulfur 35.	V.	Liquid and/or Solid.	V.	1.85 gigabecquerels (50 millicuries).
W.	Thallium 201.	W.	Liquid and/or Solid.	W.	37 gigabecquerels (1 curie).
X.	Hydrogen 3.	X.	Liquid standard manufactured and distributed under the requirements of a specific license and approved for use identified in License Condition 9.X.	X.	No single source to exceed 37 kilobecquerels (1 microcurie). Total not to exceed 550 kilobecquerels (15 microcuries).

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|-------------------------|--|--|
| Y. Carbon 14. | Y. Liquid standard manufactured and distributed under the requirements of a specific license and approved for use identified in License Condition 9.Y. | Y. No single source to exceed 37 kilobecquerels (1 microcurie).
Total not to exceed 550 kilobecquerels (15 microcuries). |
| Z. Europium 152. | Z. Electro-plated disk or sealed source manufactured and distributed under the requirements of a specific license and approved for use identified in License Condition 9.Z. | Z. No single source to exceed 740 kilobecquerels (20 microcuries).
Total not to exceed 1.5 megabecquerels (40 microcuries). |

* Annual Possession Quantity as defined in WAC 246-247-030(5).

CONDITIONS

9. Authorized Use.
- A - F. Possession and analysis of analytical and leak test samples; preparation of nuclides for transport; and commercial health physics provider services performed at client facilities and/or temporary job locations.
 - G. & H. To be used for instrument calibration and performance testing, as a commercial service and for self.
 - H. Waste brokerage services including possession, temporary storage and/or consolidation, limited to over-packing, of radioactive waste in accordance with WAC 246-254-070 (1)(g).
 - I. Material handling, packaging, preparation for transport, transfer and shipment, radiological sampling, surveys, decontamination and other commercial health physics services at client locations.

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9. J - Q. Waste brokerage services including possession, temporary storage and/or consolidation, limited to over-packing, of radioactive waste in accordance with WAC 246-254-070 (1)(g).
- R - W. Waste brokerage services including possession and storage for decay in accordance with WAC 246-254-070(1)(g).
- X - Z. To be used for instrument calibration and performance testing of Triathler portable liquid scintillation counter.**
10. Radioactive materials in must be stored and/or used at the following locations:
- A. **Subitems A - H and J - Z of items 6, 7 and 8** may be stored and/or used at 1835 Terminal Drive, Suite 200, Richland, Washington 99354; or
- B. **Subitems A - I and X - Z of items 6, 7 and 8** may be stored and/or used at temporary job sites, in areas NOT under exclusive federal jurisdiction, throughout the state of Washington. Before radioactive materials can be used at a temporary job site at any federal facility, the jurisdictional status of the job site must be determined. Authorization for use of radioactive materials at job sites under exclusive federal jurisdiction must be obtained from the appropriate regional office of the U.S. Nuclear Regulatory Commission. Before radioactive materials can be used at a temporary job site in another state, authorization must be obtained from that state if it is an Agreement State, or from the NRC if it is a non-Agreement State.
11. The licensee must comply with the provisions of chapter 246-220 WAC "Radiation Protection - General Provisions;" chapter 246-221 WAC "Radiation Protection Standards;" chapter 246-222 WAC "Radiation Protection - Worker Rights;" chapter 246-231 WAC "Packaging and Transportation of Radioactive Material;" chapter 246-232 WAC "Radioactive Material - Licensing Applicability;" chapter 246-235 WAC "Radioactive Materials - Specific Licenses;" chapter 246-247 WAC "Radiation Protection - Air Emissions;" chapter 246-249 WAC "Radioactive Waste - Use of the Commercial Disposal Site;" and as applicable, chapter 246-240 WAC "Radiation Protection - Medical use of Radioactive Material."
12. Clark B. Barton, CHP is the Radiation Safety Officer for this program.

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13. Radioactive material must be used by or under the supervision of Stephen L. Bump, CHP, Matthew P. Moeller, CHP, Clark B. Barton, CHP, Mark R. Fishburn, CHP, John James Fix, CHP, Brian P. Gleckler, CHP, Darin R. Hekkala, CHP, Tracey A. Ikenberry, CHP, Daniel Stephen Mantooth, CHP, Steven E. Merwin, CHP, Donald Neil Stewart, CHP, Pamela A. Tranbarger, CHP, Robert C. Winslow, CHP, Ellen Messer Wright, CHP, Darwin Westlund and/or Larry Michael Nolan.
14. The radioactive materials authorized in this license must not be used in animals, human beings or in products distributed to the public.
15. The licensee is authorized to transport licensed material only in accordance with the provisions of chapter 246-231 WAC, "Packaging and Transportation of Radioactive Material.
16. The licensee must monitor each individual who is likely to receive, in one year from sources external to the body, a dose in excess of ten percent of the applicable limits specified in WAC 246-221-010(1), in accordance with the criteria set forth in WAC 246-221-090 and when applicable, WAC 246-221-055.
17. The licensee's emergency procedures must conform to procedures outlined in the Washington State Radiation Emergency Handbook revised November 1991, or subsequent revisions.
18. The licensee must maintain security and control of all radioactive materials received and possessed under the license in accordance with WAC 246-221-150. Materials must be secured from, or controlled in such a manner so as to prevent unauthorized access or removal from the place of storage.
19. The licensee must maintain a documented running inventory of all unsealed radioactive materials received, possessed, used, transferred and disposed of under the license. The records must include radionuclides, activities, and disposition. Records must be maintained for inspection by the Department.
20. The licensee must conduct a physical inventory every six months to account for all sealed sources, electro-plated or foil sources received and possessed under the license. The inventory must include activities, radionuclides, source descriptions, serial numbers, locations, name of the person conducting the inventory, and the date of the inventory.

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21. The licensee must maintain a use/transfer log for each source removed from the use location stated in License Condition 10 or subsequent amendments. The use/transfer log must include, but not be limited to, dates of use, location of use, and the name of the authorized individual checking out the source.

22. Sealed sources containing radioactive material must not be opened.

23. The licensee is authorized to collect leak test samples, for their own sources, and as a commercial service. The analysis must be performed by persons specifically authorized by the Department, the U.S. Nuclear Regulatory Commission, an Agreement State, or a Licensing State to perform such services. Alternatively, leak test samples may be collected and/or analyzed by other persons specifically authorized by the Department, the U.S. Nuclear Regulatory Commission, an Agreement State, or a Licensing State to perform such services. Licensing State authorization applies to naturally occurring and accelerator produced radioactive material (NARM) only.

24. The Licensee must perform sealed source leak testing in accordance with the following conditions and criteria:

- A. 1. Each sealed or electroplated source or detector cell containing licensed material, other than hydrogen 3, with a half-life greater than thirty (30) days and in any form other than gas, must be tested for leakage and/or contamination at intervals not to exceed six months, unless the device has been granted a longer leak test interval by the regulatory authority conducting the sealed sources and device evaluation.

In the absence of a certificate from a transferor indicating that a test has been made within six (6) months prior to the transfer, a sealed source received from another person must not be put into use until tested.

2. Notwithstanding the periodic leak test required by this condition, any licensed sealed source is exempt from such leak tests when the source contains 3.7 megabecquerels (100 microcuries) or less of beta and/or gamma emitting material or 370 kilobecquerels (10 microcuries) or less of alpha emitting material.
3. Notwithstanding the periodic leak test required by this Condition, any licensed sealed source is exempt from such leak tests when the source is in permanent storage. In lieu of leak tests, the storage area must be surveyed every six months and the sources must be leak tested prior to any handling or removal from storage.

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24. B. The test must be capable of detecting the presence of 185 becquerels (0.005 microcurie) of radioactive material on the test sample. The test sample must be taken from the sealed source or from the surfaces of the device in which the sealed source is permanently mounted or stored on which one might expect contamination to accumulate. Records of leak test results must be kept in units of becquerels (or microcuries) and maintained for inspection by the department.
- C. If the test reveals the presence of 185 becquerels (0.005 microcurie) or more of removable contamination, the licensee must immediately withdraw the sealed source from use and must cause it to be decontaminated and repaired or to be disposed in accordance with department regulations. A report must be filed within five (5) days of the test with the department describing the equipment involved, the test results, and the corrective action taken.

25. Surveys for contamination must be performed and recorded weekly in designated radioactive materials use areas when radioactive materials are being used, or after each use if use is sporadic. Storage areas, including waste storage, must be surveyed at least monthly, unless no material is being stored.

Surveys must include a direct survey done with an appropriate survey instrument and a wipe survey counted with an appropriate instrument, except for low energy beta emitters. Low energy beta emitters, such as hydrogen-3, sulfur-35 and carbon-14, require a wipe survey counted with a liquid scintillation counter.

Contamination is considered present when the count rate is two (2) times background or greater on an appropriate hand-held survey instrument. If contamination is present the area will be decontaminated, surveyed, and documented until contamination is no longer present.

Liquid Scintillation Counter results must be converted to disintegrations per minute (dpm) using the nuclide specific efficiency. Contamination is considered above regulatory limits in accordance with the removable wipe limits found in WAC 246-232-140 Schedule D.

26. Survey instruments must be calibrated annually by persons specifically authorized by the department, the U.S. Nuclear Regulatory Commission, or an Agreement State to perform such services.
27. In the event the licensee chooses to terminate their Radioactive Materials License or vacate authorized use locations, the licensee must follow the applicable requirements listed in chapter 246-221 WAC, chapter 246-232 WAC and/or chapter 246-246 WAC.

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28. All individuals working directly with radioactive materials or frequenting radioactive materials use areas must receive training commensurate with their duties and responsibilities before beginning work or frequenting the area and at least annually thereafter. At a minimum training must include; health protection considerations of individuals and potential offspring; procedures to minimize exposure; purposes and functions of protective devices; company radioactive material work procedures; applicable state Regulations (Title 246 WAC) and the conditions of this license. Documentation indicating who was trained, subjects, and dates must be maintained for inspection by the department.
29. The Radiation Safety Officer must perform an annual review of the radiation safety program for adherence to the conditions of the license, Title 246 WAC and ALARA concepts. A record of this audit must be maintained for inspection by the department.
30. The licensee is authorized to hold radioactive material with a physical half-life of less than 120 days for decay-in-storage. Before the radioactive waste may be disposed of to the regular trash, the following conditions must be met:
 - A. Radioactive waste must be surveyed as follows:
Measurements are to be taken at the container's surface with no interposed shielding, with an appropriate survey meter set at its most sensitive scale; and.
The measured radiation is not to be distinguishable from background levels.
 - B. All radiation labels, markings and wording must be removed or obliterated from the waste containers.
 - C. A record of each disposal must be maintained. Records must include:
 - Date radioactive waste container was put into storage,
 - The date of the disposal;
 - Which radionuclides were disposed of;
 - Serial number of survey instrument used,
 - The measured count rate, in counts per minute;
 - The background radiation levels, in counts per minute; and
 - Name of individual performing survey.
31. Aggregation of waste by the licensee is limited to over-packing. No radioactive or mixed waste containers must be breeched, compacted, or otherwise altered during the collection and processing, except by over-packing.

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32. The licensee must maintain a decommissioning funding plan and financial surety in accordance with WAC 246-235-075 and Nuclear Regulatory Commission NUREG 1757.
- A. This plan must be submitted, approved and financial surety in place prior to receiving any radioactive waste as described in License Condition 9.H and J through W.
 - B. The decommissioning funding plan, including the cost estimate, must be updated and resubmitted, every three years, after the initial plan is accepted.
 - C. Financial Surety to cover the decommissioning funding plan must be maintained, as required by WAC 246-235-075.

33. The licensee must respond in the manner, and within the time specified to all department correspondence necessary to keep the license and related information current.

Where the licensee has submitted proposed corrective action, such action must be fully implemented in a timely manner, unless the department has subsequently modified the licensee's proposed corrective action.

34. The licensee must comply with the conditions outlined in Attachment One - Radioactive Air Emissions Attachment.
35. Except as specifically provided by this license, the licensee must possess and use radioactive material described in Items 6, 7, and 8 of this license in accordance with statements, representations and procedures contained in the documents listed below. The department's "Rules and Regulations for Radiation Protection" must govern the licensee's statements in applications or letters, unless the statements are more restrictive than the regulations.
- A. Application and attachments dated 6 August 2008.

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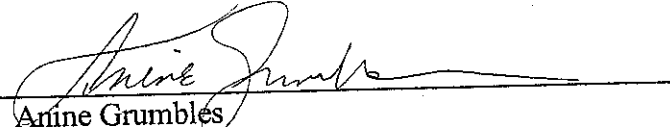
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35. B. Delegation of Authority, dated 17 September 2008.
- C. Email and attachment 10 October 2008; RE: Air Emissions info for Attachment L.
- D. Letter dated 3 January 2011; RE: Add new calibration standards.

FOR THE STATE OF WASHINGTON DEPARTMENT OF HEALTH

Date: 6 January 2011

By: 
Arine Grumbles
Radioactive Materials Licensing

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Attachment One

ATTACHMENT ONE - RADIOACTIVE AIR EMISSIONS

Maximum cumulative activity licensee may possess in a calendar year:

1. Radioactive Material	2. Physical Form	3. Annual Possession Quantity*
A. Radioactive material, atomic numbers 3-83 except special nuclear material and source material.	A. Liquid, Solid.	A. 9.25 kilobecquerels (0.25 microcuries).*
B. Hydrogen 3.	B. Liquid, Solid.	B. 3.55 gigabecquerels (96 millicuries).*
C. Natural Uranium.	C. Liquid, Solid.	C. 444 kilobecquerels (12 microcuries).*
D. Low Enriched Uranium.	D. Liquid, Solid.	D. 444 kilobecquerels (12 microcuries).*
E. Natural Thorium.	E. Liquid, Solid.	E. 266 kilobecquerels (7.2 microcuries).*
F. Natural Radium.	F. Liquid, Solid.	F. 444 kilobecquerels (12 microcuries).*
G. Hydrogen 3.	G. Gas	G. 22.2 terrabecquerels (600 curies).
H. Hydrogen 3.	H. Liquid, Solid.	H. 370 gigabecquerels (10 curies).
I. Carbon 14	I. Liquid, Solid.	I. 18.5 gigabecquerels (500 millicuries).

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J.	Cesium 137.	J.	Liquid, Solid.	J.	1.85 gigabecquerels (50 millicuries).
K.	Nickel 63	K.	Liquid, Solid.	K.	3.7 gigabecquerels (100 millicuries).
L.	Natural Uranium.	L.	Liquid, Solid.	L.	3.7 gigabecquerels (100 millicuries).
M.	Radium 226.	M.	Liquid, Solid.	M.	37 gigabecquerels (1 curie).
N.	Natural Thorium.	N.	Liquid, Solid.	N.	3.7 gigabecquerels (100 millicuries).
O.	Americium 241	O.	Liquid, Solid.	O.	3.7 megabecquerels (100 microcuries).
P.	Fluorine 18	P.	Liquid, Solid.	P.	37 gigabecquerels (1 curie).
Q.	Molybdenum 99	Q.	Liquid, Solid.	Q.	3.7 gigabecquerels (100 millicuries).
R.	Iodine 131 or Iodine 125	R.	Liquid, Solid.	R.	1.85 megabecquerels (50 microcuries).
S.	Phosphorus 32	S.	Liquid, Solid.	S.	1.85 gigabecquerels (50 millicuries).
T.	Sulfur 35	T.	Liquid, Solid.	T.	1.85 gigabecquerels (50 millicuries).
U.	Thallium 201	U.	Liquid, Solid.	U.	37 gigabecquerels (1 curie).

* Annual Possession Quantity as defined by WAC 246-247-030 (5).

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CONDITIONS

4. The total abated emission limit for this Radioactive Air Emissions Attachment is limited to **0.1 mRem/year** to the maximally exposed individual. The total limit on the potential-to-emit for this Radioactive Air Emissions Attachment is limited to **0.1 mRem/year** to the maximally exposed individual.
5. The licensee shall immediately notify the department if there are changes in the stack height, stack flow rate, distance to the Maximally Exposed Individual, or distance to nearest farms producing vegetables, meat, or milk.
6. Consolidation of any stored waste is limited to over-packing, of radioactive waste as described in WAC 246-254-070 (1)(g). No opening of packages, crushing or compacting of any wastes is permitted.
7. Prior to receiving waste for decay or storage, the licensee will perform a report of the total annual calculated potential to emit dose, using level four of Comply. The report must include the total actual undecayed activities of the radioactive material stored and or used during the calendar year and the proposed waste.
8. The licensee will notify the department, prior to receiving waste, when cumulative potential to emit is greater than or equal to 0.05 mrem/year.
9. The licensee may not receive waste if the annual cumulative potential to emit to the maximally exposed individual, as determined in condition 7, exceeds 0.1 mrem/year. The licensee must install appropriate technology to meet the BARCT requirements stated in WAC 246-247-120 and the monitoring requirements stated in WAC 246-247-075.
10. The licensee must maintain all pre-receipt Comply runs on file for inspection by the department
11. The licensee must track the inventory of all intact tritium exit signs as well as broken tritium exit signs processed. The inventory must include at least the manufacturer's name, the serial number, the activity of tritium present, the date received, date transferred from waste, and the person performing the inventory.

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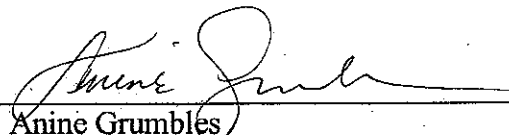
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12. The emissions from all radionuclides may be calculated, in lieu of continuous monitoring or measuring as provided by WAC 246-247-075(4). The licensee must be able to demonstrate the reliability and accuracy of emissions data.
13. The licensee must meet all reporting and record keeping requirements of chapter 246-247 WAC. The licensee shall report all measured or calculated emissions from normal operations annually, as well emissions resulting from abnormal events, such as spills or broken containers. The licensee must submit a report of the previous calendar year's air emissions to the department by June 30.
14. Except as specifically provided by this license, the licensee shall possess and use radioactive material described in Items 6, 7, and 8 of this license in accordance with statements, representations and procedures contained in the documents listed below. The department's "Rules and Regulations for Radiation Protection" shall govern the licensee's statements in applications or letters, unless the statements are more restrictive than the regulations.

FOR THE STATE OF WASHINGTON DEPARTMENT OF HEALTH

Date: 6 January 2011

By: _____


Anine Grumbles
Radioactive Materials Licensing