



ADMINISTRATIVE RULES OF MONTANA



37.14.102 DEFINITIONS

As used in this chapter, these terms have the definitions set forth below. Additional definitions used only in a certain subchapter will be found in that subchapter.

- (1) "Accelerator-produced material" means any material made radioactive by a particle accelerator.
- (2) "Act" means Title 75, chapter 3, MCA.
- (3) "Agreement state" means any state with which the US nuclear regulatory commission or the US atomic energy commission has entered into an effective agreement under subsection 274b. of the Atomic Energy Act of 1954, as amended (73 Stat. 689) .
- (4) "Airborne radioactive material" means any radioactive material dispersed in the air in the forms of dusts, fumes, mists, vapors, or gases.
- (5) "Airborne radioactivity area" means:
 - (a) any room, enclosure, or operating area in which airborne radioactive material exists in concentrations in excess of the amounts specified in Appendix A, Table I, Column 1, of subchapter 7; or
 - (b) any room, enclosure, or operating area in which airborne radioactive material exists in concentrations which, averaged over the number of hours in any week during which individuals are in the area, exceed 25% of the amounts specified in Appendix A, Table I, Column 1 of subchapter 7.
- (6) "Byproduct material" means a radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material.
- (7) "Calendar quarter" means not less than 12 consecutive weeks nor more than 14 consecutive weeks. The first calendar quarter of each year shall begin in January and subsequent calendar quarters shall be so arranged such that no day is included in more than 1 calendar quarter and no day in any 1 year is omitted from inclusion within a calendar quarter. No licensee or registrant shall change the method observed by him of determining calendar quarters for purposes of these rules except at the beginning of a calendar year.
- (8) "CFR" means code of federal regulations.
- (9) "Curie" means a unit of measurement of radioactivity. One curie (Ci) is that quantity of radioactive material which decays at the rate of 3.7×10^{10} disintegrations per second (dps) . Commonly used

submultiples of the curie are the millicurie and the microcurie. One millicurie (mCi) = 0.001 curie = 3.7×10^7 dps. One microcurie (μ Ci) = 0.000001 curie = 3.7×10^4 dps.

- (10) "Department" means the department of public health and human services.
- (11) "Depleted uranium" means the source material uranium in which the isotope uranium-235 is less than 0.711 weight percent of the total uranium present. Depleted uranium does not include special nuclear material.
- (12) "Dose" as used in this chapter means absorbed dose or dose equivalent as appropriate.
 - (a) "Absorbed dose" is the energy imparted to matter by ionizing radiation per unit mass of irradiated material at the place of interest. The special unit of absorbed dose is the rad.
 - (b) "Dose equivalent" is a quantity that expresses on a common scale for all radiation a measure of the postulated effect on a given organ. It is defined as the absorbed dose in rads times certain modifying factors. The unit of dose equivalent is the rem.
- (13) "Dose commitment" means the total radiation dose to a part of the body that will result from retention in the body of radioactive material. For purposes of estimating the dose commitment, it is assumed that from the time of intake the period of exposure to retained material will not exceed 50 years.
- (14) "Exposure" means the quotient of dQ by dm where "dQ" is the absolute value of the total charge of the ions of 1 sign produced in air when all the electrons (negatrons and positrons) liberated by photons in a volume element of air having mass "dm" are completely stopped in air.
- (15) "Exposure rate" means the exposure per unit of time, such as Roentgen (R) per minute and mR per hour.
- (16) "Former United States atomic energy commission (AEC) or United States nuclear regulatory commission (NRC) licensed facilities" means nuclear reactors, nuclear fuel reprocessing plants, uranium enrichment plants, or critical mass experimental facilities where AEC or NRC licenses have been terminated.
- (17) "Healing arts" means diagnostic and/or healing treatment of human and animal maladies including but not limited to the following which are duly licensed by the state of Montana for the lawful practice of: medicine and its associated specialties, dentistry, veterinary medicine, osteopathy, chiropractic, and podiatry.
- (18) "High radiation area" means any area, accessible to individuals, in which there exists radiation at such levels that a major portion of the body could receive in any 1 hour a dose in excess of 100 millirems.
- (19) "Human use" means the internal or external administration of radiation or radioactive material to human beings.
- (20) "Individual" means any human being.
- (21) "Inspection" means an official examination or observation including but not limited to, tests, surveys, and monitoring to determine compliance with rules, regulations, orders, requirements and conditions of the department.
- (22) "License" means a license issued by the department in accordance with the rules adopted by the department.

- (23) "Licensee" means any person who is licensed by the department in accordance with these rules and the act.
- (24) "Licensing state" means any state with regulations equivalent to the suggested state regulations for control of radiation relating to, and an effective program for, the regulatory control of NARM.
- (25) "Major processor" means a user processing, handling, or manufacturing radioactive material exceeding Type A quantities as unsealed sources or material, or exceeding 4 times Type B quantities as sealed sources, but does not include nuclear medicine programs, universities, industrial radiographers or small industrial programs. Type A quantity and Type B quantity is a quantity of radioactive material the aggregate radioactivity of which does not exceed that specified in the following table:

Transport Groups (see Table A)	Type A Quantity (in curies)	Type B Quantity (in curies)
I	0.001	20
II	0.05	20
III	3	200
IV	20	5,000
V	20	50,000
VI and VII	1,000	5,000
Special form	20*	5,000

*Except that for californium-252, the limit is 2 Ci.

- (26) "NARM" means any naturally occurring or accelerator-produced radioactive material except source material.
- (27) "Natural radioactivity" means radioactivity of naturally occurring nuclides.
- (28) "Occupational dose" means exposure of an individual to radiation:
- (a) in a restricted area; or
 - (b) in the course of employment in which the individual's duties involve exposure to radiation; provided, that occupational dose shall not be deemed to include any exposure of an individual to radiation for the purpose of diagnosis or therapy of such individual.
- (29) "Ore refineries" means all processors of a radioactive material ore.
- (30) "Particle accelerator" means any machine capable of accelerating electrons, protons, deuterons, or other charged particles in a vacuum and of discharging the resultant particulate or other radiation into a medium at energies usually in excess of 1 MeV.
- (31) "Person" means "any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, agency, political subdivision or agency thereof, and any legal successor,

representative, agent or agency of the foregoing, other than the United States nuclear regulatory commission, any successor thereto, or federal agencies licensed by the nuclear regulatory commission."

- (32) "Personnel monitoring equipment" means devices (e.g., film badges, pocket dosimeters, and thermoluminescent dosimeters) designed to be worn or carried by an individual for the purpose of estimating the dose received by the individual.
- (33) "Pharmacist" means an individual licensed by this state to compound and dispense drugs, prescriptions, and poisons.
- (34) "Physician" means a duly licensed physician authorized to dispense drugs in the practice of medicine in Montana.
- (35) "Rad" means the special unit of absorbed dose. One rad equals one hundredth of a joule per kilogram of material; for example, if tissue is the material of interest, then 1 rad equals 100 ergs per gram of tissue.
- (36) "Radiation" means ionizing radiation, i.e., gamma rays and x-rays, alpha and beta particles, high speed electrons, neutrons, and other nuclear particles.
- (37) "Radiation area" means any area, accessible to individuals, in which there exists radiation at such levels that a major portion of the body could receive in any 1 hour a dose in excess of 5 millirems, or in any 5 consecutive days a dose in excess of 100 millirems.
- (38) "Radiation machine" means any device capable of producing radiation except those which produce radiation only from radioactive material.
- (39) "Radiation safety officer" means one who has the knowledge and responsibility to apply appropriate radiation protection regulations.
- (40) "Radioactive material" means any material (solid, liquid, or gas) which emits radiation spontaneously.
- (41) "Radioactivity" means the disintegration of unstable atomic nuclei by the emission of radiation.
- (42) "Registrant" means any person who is registered with the department and is legally obligated to register with the department pursuant to this chapter and the act.
- (43) "Registration" means "the registering with the department by the legal owner, user, or authorized representative of sources of ionizing radiation in the manner prescribed by rule."
- (44) "Regulations of the US department of transportation" means the regulations in 49 CFR Parts 100-189.
- (45) "Rem" means a measure of the dose of any radiation to body tissue in terms of its estimated biological effect relative to a dose received from an exposure to 1 roentgen (R) of x-rays. (1 millirem (mrem) = 0.001 rem) For the purpose of this chapter, any of the following is considered to be equivalent to a dose of 1 rem:
 - (a) An exposure of 1 R of X, or gamma radiation.
 - (b) A dose of 1 rad due to X, gamma, or beta radiation.
 - (c) A dose of 0.05 rad due to particles heavier than protons and with sufficient energy to reach the lens of the eye.

(d) A dose of 0.1 rad due to neutrons or high energy protons.

- (i) If it is more convenient to measure the neutron flux, or equivalent, than to determine the neutron absorbed dose in rads, 1 rem of neutron radiation may, for purposes of this chapter, be assumed to be equivalent to 14 million neutrons per square centimeter incident upon the body; or if there exists sufficient information to estimate with reasonable accuracy the approximate distribution in energy of the neutrons, the incident number of neutrons per square centimeter equivalent to 1 rem may be estimated from the following table:

Neutron Flux Dose Equivalents

Neutron energy (MeV)	Number of neutrons per square centimeter for a dose equivalent of 1 rem (neutrons/cm ²)	Average flux density to deliver 100 millirems in 40 hours (neutrons/cm ² per second)
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Thermal	970 x 10 ⁶	670
0.0001	720 x 10 ⁶	500
0.005	820 x 10 ⁶	570
0.02	400 x 10 ⁶	280
0.1	120 x 10 ⁶	80
0.5	43 x 10 ⁶	30
1.0	26 x 10 ⁶	

6	.....	18
2.5	.....	29 x 10
6	.....	20
5.0	.....	26 x 10
6	.....	18
7.5	.....	24 x 10
6	.....	17
10.0	.....	24 x 10
6	.....	17
10 to 30	.....	14 x 10
6	.....	10

- (46) "Research and development" means theoretical analysis, exploration, or experimentation; or the extension of investigative findings and theories of a scientific or technical nature into practical application for experimental and demonstration purposes, including the experimental production and testing of models, devices, equipment, materials, and processes. Research and development does not include the internal or external administration of radiation or radioactive material to human beings.
- (47) "Restricted area" (controlled area) means any area access to which is controlled by the licensee or registrant for purposes of protection of individuals from exposure to radiation and radioactive material. "Restricted area" shall not include any areas used for residential quarters, although a separate room or rooms in a residential building may be set apart as a restricted area.
- (48) "Roentgen" (R) means the special unit of exposure. One roentgen equals 2.58×10^{-4} coulombs/kilogram of air.
- (49) "Sealed source" means radioactive material that is permanently bonded or fixed in a capsule or matrix designed to prevent release and dispersal of the radioactive material under the most severe conditions which are likely to be encountered in normal use and handling.
- (50) "Source material" means uranium, thorium, or any other material which the department or the United States nuclear regulatory commission declares by order to be source material or ores containing 1 or more of the foregoing materials in such concentration as the department or the nuclear regulatory commission declares by order to be source material after the nuclear regulatory commission has determined the material in such concentration to be source material.
- (51) "Source of radiation" means any radioactive material, or any device or equipment emitting or capable of producing radiation.
- (52) "Special form" means any of the following physical forms of licensed material of any transport group:

- (a) The material is in solid form having no dimension less than 0.5 millimeter or at least 1 dimension greater than 5 millimeters; does not melt, sublime, or ignite in air at a temperature of 1,000 E F; will not shatter or crumble if subjected to the percussion test described in Table B of this subchapter; and is not dissolved or converted into dispersible form to the extent of more than 0.005% by weight by immersion for 1 week in water at 68 E F or in air at 86 E F.
 - (b) The material is securely contained in a capsule having no dimension less than 0.5 millimeter or at least 1 dimension greater than 5 millimeters, which will retain its contents if subjected to the tests prescribed in Appendix B of this subchapter and which is constructed of materials which do not melt, sublime, or ignite in air at 1,475 E F, and do not dissolve or convert into dispersible form to the extent of more than 0.005% by weight by immersion for 1 week in water at 68 E F or in air at 86 E F.
- (53) "Special nuclear material in quantities not sufficient to form a critical mass" means uranium enriched in the isotope U-235 in quantities not exceeding 350 grams of contained U-235; uranium-233 in quantities not exceeding 200 grams; plutonium in quantities not exceeding 200 grams; or any combination of them in accordance with the following formula: For each kind of special nuclear material, determine the ratio between the quantity of that special nuclear material and the quantity specified above for the same kind of special nuclear material. The sum of such ratios for all of the kinds of special nuclear material in combination shall not exceed "1" (i.e., unity) . For example, the following quantities in combination would not exceed the limitation and are within the formula:

$$\frac{175 \text{ (grams contained U-235)}}{350} + \frac{50 \text{ (grams U-233)}}{200} + \frac{50 \text{ (grams Pu)}}{200} = 1$$

- (54) "Survey" means an evaluation of the production, use, release, disposal, and/or presence of sources of radiation under a specific set of conditions to determine actual or potential radiation hazards. When appropriate, such evaluation includes, but is not limited to tests, physical examination and measurements of levels of radiation or concentration of radioactive material present.
- (55) "Test" means a method for determining the characteristics of condition of sources of radiation or components thereof.
- (56) "Transport group" means any 1 of 7 groups into which radionuclides in normal form are classified, according to their toxicity and their relative potential hazard in transport, in Table A of this subchapter.
 - (a) Any radionuclide not specifically listed in 1 of the groups in Table A shall be assigned to 1 of the groups in accordance with the following table:

Radioactive half-life

Radionuclide	0 to 1000 days	1000 days to 10 ⁶ years	Over 10 ⁶ years
Atomic number 1-81	Group III	Group II	Group III
Atomic number 82 and over.	Group I	Group I	Group III

(b) For mixtures of radionuclides the following shall apply:

- (i) If the identity and respective activity of each radionuclide are known, the permissible activity of each radionuclide shall be such that the sum, for all groups present, of the ratio between the total activity for each group to the permissible activity for each group will not be greater than unity.
- (ii) If the groups of the radionuclides are known but the amount in each group cannot be reasonably determined, the mixture shall be assigned to the most restrictive group present.
- (iii) If the identity of all or some of the radionuclides cannot be reasonably determined, each of those unidentified radionuclides shall be considered as belonging to the most restrictive group which cannot be positively excluded.
- (iv) Mixtures consisting of a single radioactive decay chain where the radionuclides are in the naturally occurring proportions shall be considered as consisting of a single radionuclide. The group and activity shall be that of the first member present in the chain, except that if a radionuclide "X" has a half-life longer than that of that first member and an activity greater than that of any other member, including the first, at any time during transportation, the transport group of the nuclide "X" and the activity of the mixture shall be the maximum activity of that nuclide "X" during transportation.

(57) "US department of energy" means the department of energy established by Public Law 95-91, August 4, 1977, 91 Stat. 565, 42 USC 7101, et seq., to the extent that the department exercises functions formerly vested in the US atomic energy commission, its chairman, its members, officers and components and transferred to the US energy research and development administration and to the administrator thereof pursuant to sections 104(b), (c) and (d) of the Energy Reorganization Act of 1974 (Public Law 93-438, October 11, 1974, 88 Stat. 1233 at 1237, effective January 19, 1975) and retransferred to the secretary of energy pursuant to section 301(a) of the Department of Energy Organization Act (Public Law 95-91, August 4, 1977, 91 Stat. 565 at 577-578, 42 USC 7151, effective October 1, 1977) .

(58) "Unrefined and unprocessed ore" means ore in its natural form prior to any processing, such as grinding, roasting, beneficiating, or refining.

- (59) "Unrestricted area" (uncontrolled area) means any area access to which is not controlled by the licensee or registrant for purposes of protection of individuals from exposure to radiation and radioactive material, and any area used for residential quarters.
- (60) "Waste handling licensees" mean persons licensed to receive and store radioactive wastes prior to disposal and/or persons licensed to dispose of radioactive waste.
- (61) "Worker" means an individual engaged in work under a license or registration issued by the department and controlled by a licensee or registrant, but does not include the licensee or registrant.

Authorizing statute(s): Sec. 75-3-201, 75-3-202 and 75-3-204, MCA

Implementing statute(s): Sec. 75-3-201, 75-3-202 and 75-3-204, MCA

History: NEW, 1980 MAR p. 1069, Eff. 3/28/80; TRANS, from DHES, 1996 MAR p. 433; TRANS, from DEQ, 2000 MAR p. 189.