

1 **DRAFT C 05/13/2022**

2 **DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT**

3 **Hazardous Materials and Waste Management Division**

4 **RADIATION CONTROL – PHYSICAL PROTECTION OF CATEGORY 1 AND CATEGORY 2**
5 **QUANTITIES OF RADIOACTIVE MATERIAL**

6 **6 CCR 1007-1 Part 22**

7 *[Editor's Notes follow the text of the rules at the end of this CCR Document.]*

9 **Adopted by the Board of Health on ~~August 19, 2020~~ October 19, 2022; effective ~~October 15, 2020~~**
10 **December 15, 2022.**

11 **PHYSICAL PROTECTION OF CATEGORY 1 AND CATEGORY 2 QUANTITIES OF RADIOACTIVE**
12 **MATERIAL**

13 **22.1 Authority.**

14 22.1.1 Rules and regulations set forth herein are adopted pursuant to the provisions of section 25-1-108,
15 25-1.5-101(1)(k) and (1)(l), and 25-11-104, CRS.

16 **Section A – General provisions**

17 **22.2 Scope, Purpose and Applicability.**

18 22.2.1 Scope and Purpose.

19 **22.2.1.1** This Part has been established to provide the requirements for the physical
20 protection program for any licensee that possesses an aggregated category 1 or
21 category 2 quantity of radioactive material listed in Appendix A to this Part. These
22 requirements provide reasonable assurance of the security of category 1 or
23 category 2 quantities of radioactive material by protecting these materials from
24 theft or diversion. Specific requirements for access to material, use of material,
25 transfer of material, and transport of material are included. No provision of this
26 Part authorizes possession of licensed material.

27 22.2.2 Applicability.

28 **22.2.2.1** Sections B and C of this part apply to any person who, under these regulations-,
29 possesses or uses at any site, an aggregated category 1 or category 2 quantity
30 of radioactive material.

31 22.2.2.2 Section D of this part applies to any person who, under these regulations:

- 32 (1) Transports or delivers to a carrier for transport in a single shipment, a category 1
33 or category 2 quantity of radioactive material; or
- 34 (2) Imports or exports a category 1 or category 2 quantity of radioactive material; the
35 provisions only apply to the domestic portion of the transport.

Commented [JSJ1]: Editorial note 1: All comments (such as this one) shown in the right side margin of this draft document are for information purposes only to assist the reader in understanding the proposed rule change during the review and comment process. These side margin notes are **not** part of the rule and all comments will be deleted prior to publication of the final rule by the Colorado Secretary of State.
Editorial note 2: Alignment and formatting corrections and minor typographical adjustments may be made in the rule and may not be specifically identified with a side margin comment.

Editorial note 3: The acronym "RATS 2021-2" shown in side margins of this draft refers to the U.S. Nuclear Regulatory Commission (NRC) regulatory action tracking system (RATS). This system is used to identify and summarize changes to federal regulations that may be required for adoption by an NRC agreement state. To maintain agreement state status, and consistent with statute, Colorado's radiation regulations must be compatible with federal regulations of the NRC.

Colorado statute also prescribes that the radiation control regulations must be consistent with the model regulations of the Conference of Radiation Control Program Directors, Inc. (CRCPD). The CRCPD model regulation equivalent to part 22 was last updated in 2014, and does not yet reflect federal rule changes since that time.

Editorial note 4: This is not a complete rule. Some unaffected sections or provisions have been removed from the rule and are not shown in this draft. Unaffected sections/provisions are denoted with a " * * * ".

Commented [JSJ2]: The stated adoption and effective dates are tentative and subject to change, pending Board of Health meeting schedule, final adoption of the rule by the Board, and the Colorado Register publication dates.

The anticipated dates are based on the annual rulemaking schedule (regulatory agenda) for the Department which may be found [online](#).

Commented [JSJ3]: 22.2.1 has been formatted for alignment of text.

Commented [JSJ4]: Delete unneeded space. 22.2.2 has been formatted for alignment of text.

36 22.2.3 Published material incorporated by reference.

37 22.2.3.1 Throughout this Part 22, federal regulations, state regulations, and standards or
38 guidelines of outside organizations have been adopted and incorporated by
39 reference. Unless a prior version of the incorporated material is otherwise
40 specifically indicated, the materials incorporated by reference cited herein include
41 only those versions that were in effect as of the most recent effective date of this
42 Part 22 (October 15, 2020December 15, 2022), and not later amendments or
43 editions of the incorporated material.

Commented [JSJ5]: In addition to the identified change in effective date, provisions in 22.2.3 have been formatted for alignment of text and appearance.

44 22.2.3.2 Materials incorporated by reference are available for public inspection, and
45 copies (including certified copies) can be obtained at reasonable cost, during
46 normal business hours from the Colorado Department of Public Health and
47 Environment, Hazardous Materials and Waste Management Division, 4300
48 Cherry Creek Drive South, Denver, Colorado 80246. Additionally,
49 <https://www.colorado.gov/cdphe/radregs> identifies where the incorporated federal
50 and state regulations are available to the public on the internet at no cost. A copy
51 of the materials incorporated in this Part is available for public inspection at the
52 state publications depository and distribution center.

53 22.2.3.3 Availability from Source Agencies or Organizations.

54 (1) All federal agency regulations incorporated by reference herein are available at
55 no cost in the online edition of the Code of Federal Regulations (CFR) hosted by
56 the U.S. Government Printing Office, online at www.govinfo.gov.

57 (2) All state regulations incorporated by reference herein are available at no cost in
58 the online edition of the Code of Colorado Regulations (CCR) hosted by the
59 Colorado Secretary of State's Office, online at
60 <https://www.sos.state.co.us/CCR/RegisterHome.do>.

61 22.2.4 Basis and Purpose.

62 22.2.4.1 A statement of basis and purpose accompanies this part and changes to
63 this part. A copy may be obtained from the Department.

Commented [JSJ6]: Standard language added for consistency with formatting and content of other regulatory parts.

64 [* * * DENOTES UNAFFECTED SECTIONS/PROVISIONS IN THE DRAFT RULE]

65 * * *

66 Part 22, Appendix A - Category 1 and Category 2 Radioactive Materials

67 Table 1—Category 1 and Category 2 Threshold

68 The terabecquerel (TBq) values are the regulatory standard. The curie (Ci) values specified are obtained
69 by converting from the TBq value. The curie values are provided for practical usefulness only.

Radioactive material	Category 1 (TBq)	Category 1 (Ci)	Category 2 (TBq)	Category 2 (Ci)
Americium-241	60	1,620	0.6	16.2
Americium-241/Be	60	1,620	0.6	16.2
Californium-252	20	540	0.2	5.40
Cobalt-60	30	810	0.3	8.10
Curium-244	50	1,350	0.5	13.5
Cesium-137	100	2,700	1	27.0

Gadolinium-153	1,000	27,000	10	270
Iridium-192	80	2,160	0.8	21.6
Plutonium-238	60	1,620	0.6	16.2
Plutonium-239/Be	60	1,620	0.6	16.2
Promethium-147	40,000	1,080,000	400	10,800
Radium-226	40	1,080	0.4	10.8
Selenium-75	200	5,400	2	54.0
Strontium-90	1,000	27,000	10	270
Thulium-170	20,000	540,000	200	5,400
Ytterbium-169	300	8,100	3	81.0

71 Note: Calculations Concerning Multiple Sources or Multiple Radionuclides The "sum of fractions" methodology for evaluating
72 combinations of multiple sources or multiple radionuclides is to be used in determining whether a location meets or exceeds the
73 threshold and is thus subject to the requirements of this Part.

74 I. If multiple sources of the same radionuclide and/or multiple radionuclides are aggregated at a location, the sum of the
75 ratios of the total activity of each of the radionuclides must be determined to verify whether the activity at the location is less than the
76 category 1 or category 2 thresholds of Table 1, as appropriate. If the calculated sum of the ratios, using the equation below, is
77 greater than or equal to 1.0, then the applicable requirements of this Part apply.

78 II. First determine the total activity for each radionuclide from Table 1. This is done by adding the activity of each individual
79 source, material in any device, and any loose or bulk material that contains the radionuclide. Then use the equation below to
80 calculate the sum of the ratios by inserting the total activity of the applicable radionuclides from Table 1 in the numerator of the
81 equation and the corresponding threshold activity from Table 1 in the denominator of the equation. Calculations must be performed
82 in metric values (i.e., TBq) and the numerator and denominator values must be in the same units.

- 83
- 84 R_1 = total activity for radionuclide 1
- 85 R_2 = total activity for radionuclide 2
- 86 R_N = total activity for radionuclide n
- 87 AR_1 = activity threshold for radionuclide 1
- 88 AR_2 = activity threshold for radionuclide 2
- 89 AR_N = activity threshold for radionuclide n

~~$$\sum_1^n \left[\frac{R_1}{AR_1} + \frac{R_2}{AR_2} + \frac{R_n}{AR_n} \right] \geq 1.0$$~~

$$\frac{R_1}{AR_1} + \frac{R_2}{AR_2} + \dots + \frac{R_n}{AR_n} \geq 1.0$$

Commented [JSJ7]:
The current sum of fractions equation is deleted and replaced with an updated sum of fractions equation. The correction is necessary to make the expression mathematically reflect that an indefinite number of nuclides may be included in the calculation. The change is consistent with the December 2021 updates to federal rule in 10 CFR Part 37.

[Editorial note: due to the equations being an image/graphic in WORD, the normal strike out text and bold/colored text "track changes" functions do not work.]

[NRC Compatibility B](#)
[NRC RATS 2021-2](#)