

1 DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

2 Hazardous Materials and Waste Management Division

3 RADIATION CONTROL - REGISTRATION AND LICENSING OF TECHNOLOGICALLY
4 ENHANCED NATURALLY OCCURRING RADIOACTIVE MATERIAL (TENORM)

5 **6 CCR 1007-1 Part 20**

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

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8 **Adopted by the Board of Health on November 18, 2020; effective January 14, 2021.**

9 **Persons subject to this rule shall be compliant with this Part on or before October 14,**
10 **2021.**

11 **Part 20 REGISTRATION AND LICENSING OF TECHNOLOGICALLY ENHANCED**
12 **NATURALLY OCCURRING RADIOACTIVE MATERIAL (TENORM)**

13 **20.1 Purpose and Scope.**

14 **20.1.1** Authority.

15 A. Rules and regulations set forth herein are adopted pursuant to the provisions of
16 sections 25-11-104, CRS.

17 20.1.2 Basis and Purpose.

18 A. A statement of basis and purpose accompanies this part and changes to this
19 Part. A copy may be obtained from the Department.

20 20.1.3 Scope.

21 A. This Part establishes requirements and provisions for the generation, handling,
22 processing, transfer, receipt, transportation, disposal, possession, distribution,
23 and beneficial use of technologically enhanced naturally occurring radioactive
24 materials (TENORM) and for the registration and issuance of licenses authorizing
25 these activities. These requirements and provisions provide for the protection of
26 public health and radiation safety of workers and the general public.

27 B. Requirements and provisions in this Part 20 become enforceable nine months
28 after the effective date of this Part.

29 20.1.4 Applicability.

Commented [GJ1]: EDITORIAL NOTE:
Side margin comments as shown here are not part of the rule and are for information only, with the intent to aid the reader in understanding the proposed changes in the draft regulations. All side margin comments will be removed prior to publication as a final rule and are not part of the rule.
Additional spaces have been added into the draft rule to allow longer side margin comments to be viewed. These added spaces and this comment is not part of the rule and will be removed prior to final publication

Commented [JSJ2]: EDITORIAL NOTE: Throughout this Rev B of the draft rule, the numbering has changed to better conform to the Colorado Secretary of State style manual for new rules.

This impacts all numbering in paragraphs below the "20.#.#" sections as follows:
"(1)" is now "A." in Rev B
"A." is now "1." in Rev B
"(i)" is now "a." in Rev B
"(a)" is now "(1)" in Rev B
"(1)" is now "(a)" in Rev B

For example in Rev A, provision "20.5.1(2)A" is now "20.5.1.B.1" in Rev B.

These along with formatting/alignment changes are not shown as redline/strikeout changes in Rev B of the draft rule as it was felt they would distract from the content and substantial changes in the rule.

- 30 A. The requirements and provisions of these regulations apply to any person who
31 generates, handles, processes, transfers, receives, transports, disposes of,
32 possesses, distributes, or beneficially uses TENORM unless specifically
33 exempted.
- 34 B. Source material is not subject to the requirements or provisions of this Part.
- 35 20.1.5 Published material incorporated by reference.
- 36 A. Throughout this Part 20, federal regulations, state regulations, and standards or
37 guidelines of outside organizations have been adopted and incorporated by
38 reference. Unless a prior version of the incorporated material is otherwise
39 specifically indicated, the materials incorporated by reference cited herein include
40 only those versions that were in effect as of the most recent effective date of this
41 Part 20 (January 2020), and not later amendments or editions of the incorporated
42 material.
- 43 B. Materials incorporated by reference are available for public inspection, and
44 copies (including certified copies) can be obtained at reasonable cost, during
45 normal business hours from the Colorado Department of Public Health and
46 Environment, Hazardous Materials and Waste Management Division, 4300
47 Cherry Creek Drive South, Denver, Colorado 80246. Additionally,
48 <https://www.colorado.gov/cdphe/radregs> identifies where the incorporated
49 materials are available to the public on the internet at no cost. Due to copyright
50 restrictions certain materials incorporated in this Part are available for public
51 inspection at the state publications depository and distribution center.
- 52 20.1.6 Availability from Source Agencies or Organizations.
- 53 A. All federal agency regulations incorporated by reference herein are available at
54 no cost in the online edition of the Code of Federal Regulations (CFR) hosted by
55 the U.S. Government Printing Office, online at www.govinfo.gov.
- 56 B. All state regulations incorporated by reference herein are available at no cost in
57 the online edition of the Code of Colorado Regulations (CCR) hosted by the
58 Colorado Secretary of State's Office, online at
59 <https://www.sos.state.co.us/CCR/RegisterHome.do>.
- 60 C. Copies of the standards or guidelines of outside organizations are available
61 either at no cost or for purchase from the source organizations listed below.

62 1. TBD

63 **20.2 Definitions.**

64 As used in this part, these terms have the definitions set forth as follows:

65 "Background radiation" means radiation from:

- 66 A. Extraterrestrial sources;
- 67 B. Naturally occurring radioactive material (which has not been technologically
68 enhanced), including radon (except as a decay product of source or special
69 nuclear material); and
- 70 C. Global fallout as it exists in the environment from the testing of nuclear explosive
71 devices or from past nuclear accidents such as Chernobyl that are not under the
72 control of the licensee or registrant.

73 Background radiation does not include sources of radiation from radioactive materials
74 regulated by NRC.

75 "Beneficial Use" means:

- 76 A. The use of solid waste as an ingredient in a manufacturing process, or as an
77 effective substitute for natural or commercial products, in a manner that does not
78 pose a threat to human health or the environment. Avoidance of processing or
79 disposal cost alone does not constitute beneficial use; or
- 80 B. The use of the nutrients and/or organic matter in biosolids to act as a soil
81 conditioner or fertilizer for the promotion of vegetative growth on land; or
- 82 C. The use of the nutrients and/or moisture in water treatment residuals to act as a
83 soil conditioner or low grade fertilizer for the promotion of vegetative growth on
84 the land.

85 "Biosolids" means the accumulated treated residual product resulting from a domestic wastewater
86 treatment works. Biosolids does not include grit or screenings from a wastewater treatment
87 works, commercial or industrial sludges (regardless of whether the sludges are combined with
88 domestic sewage), sludge generated during treatment of drinking water, or domestic or industrial
89 septage.

90 "Centralized E&P waste management facility" means a facility, other than a commercial disposal
91 facility regulated by the Colorado Department of Public Health and Environment, that (1) is either
92 used exclusively by one owner or operator or used by more than one operator under an operating
93 agreement; and (2) is operated for a period greater than three (3) years; and (3) receives for
94 collection, treatment, temporary storage, and/or disposal produced fluids, produced water, drilling
95 fluids, completion fluids, and any other E&P wastes that are generated from two or more
96 production units or areas or from a set of commonly owned or operated leases. This definition
97 includes oil-field naturally occurring radioactive materials (NORM) related storage,
98 decontamination, treatment, or disposal.

99 "Class II wells" are wells which inject fluids:

- 100 A. Which are brought to the surface in connection with natural gas storage
101 operations, or oil or natural gas production and may be commingled with waste
102 waters from gas plants which are an integral part of production operations,
103 unless those waters are classified as a hazardous waste at the time of injection.

Commented [GJ3]: Definitions from 6 CCR 1007-2 Part 1, 5 CCR 1002-64, and 5 CCR 1003-7.

Commented [GJ4]: Definition taken from 2 CCR 404-1

Commented [GJ5]: This as well as other certain definitions have been removed because the term defined is not used within the rule and the definition provides no value to the interpretation of the rule.

104 B. For enhanced recovery of oil or natural gas; and

105 C. For storage of hydrocarbons which are liquid at standard temperature and
106 pressure.

107 "Commercial composting facility" means any solid waste composting facility that accepts a fee for
108 solid waste composting, or any solid waste composting facility that composts solid waste to
109 create a compost or soil amendment and distributes the finished compost or soil amendment
110 offsite for a fee.

111 "Compost" means the material or product which is developed under controlled conditions and
112 which results from biological degradation processes by which organic wastes decompose.

113 "Composting" means the biological process of degrading organic materials that is facilitated and
114 controlled through intentional and active manipulation. These manipulations may include but are
115 not limited to grinding, mixing of feed stocks and bulking materials, addition of liquids, turning of
116 piles, vermicomposting, or mechanical manipulation.

117 "Compost facility" means a site where compost is produced.

118 "Compost feedstock" or "Feedstock" means any decomposable organic material used in the
119 production of compost or chipped and ground material including, but not limited to, green wastes,
120 animal material, manure, biosolids, and solid waste.

121 "Domestic wastewater treatment works" means a system or facility for treating, neutralizing,
122 stabilizing, or disposing of domestic wastewater which system or facility has a designed capacity
123 to receive more than two thousand gallons of domestic wastewater per day. The term "domestic
124 wastewater treatment works" also includes appurtenances to such system or facility, such as
125 outfall sewers and pumping stations, and to equipment relating to such appurtenances. The term
126 "domestic wastewater treatment works" does not include industrial wastewater treatment plants
127 or complexes whose primary function is the treatment of industrial wastes, notwithstanding the
128 fact that human wastes generated incidentally to the industrial processes are treated therein.

129 "Drilling fluid" means a mixture of clay and other chemicals with oil or water that is circulated
130 around the drill bit in oil-well drilling in order to lubricate and cool the bit, flush rock cuttings to the
131 surface, and plaster the side of the well to prevent cave-ins.

132 "Dry weight" means the mass of materials excluding the mass of any water or moisture present
133 within the materials.

134 "Exploration and production waste (E&P waste)" means those wastes associated with operations
135 to locate or remove oil or gas from the ground or to remove impurities from such substances and
136 which are uniquely associated with and intrinsic to oil and gas exploration, development, or
137 production operations that are exempt from regulation under Subtitle C of the Resource
138 Conservation and Recovery Act (RCRA), 42 USC Sections 6921, et seq. For natural gas, primary
139 field operations include those production-related activities at or near the wellhead and at the gas
140 plant (regardless of whether or not the gas plant is at or near the wellhead), but prior to transport
141 of the natural gas from the gas plant to market. In addition, uniquely associated wastes derived
142 from the production stream along the gas plant feeder pipelines are considered E&P wastes,

DRAFT TENORM Rule, Revision B (Redline removed).

July 09, 2020

143 even if a change of custody in the natural gas has occurred between the wellhead and the gas
144 plant. In addition, wastes uniquely associated with the operations to recover natural gas from
145 underground storage fields are considered to be E&P waste.

146 "Final product" or "Final product material" means a finished soil amendment, compost or fertilizer
147 which is intended for beneficial use and which contains a biosolids component.

148 "Flowline" means a segment of pipe transferring oil, gas, or condensate between a wellhead and
149 processing equipment to the load point or point of delivery to a U.S. Department of Transportation
150 Pipeline and Hazardous Materials Safety Administration or Colorado Public Utilities Commission
151 regulated gathering line or a segment of pipe transferring produced water between a wellhead
152 and the point of disposal, discharge, or loading. This definition of flowline does not include a
153 gathering line.

154 "Gathering line" means a gathering pipeline or system as defined by the Colorado Public Utilities
155 Commission, Regulation No. 4, 4 C.C.R. 723-4901, Part 4, (4 C.C.R. 723-4901) or a pipeline
156 regulated by the U.S. Department of Transportation Pipeline and Hazardous Materials Safety
157 Administration pursuant to 49 C.F.R. §§ 195.2 or 192.8. 49 C.F.R. §§ 195.2 or 192.8 and 4
158 C.C.R. 723-4901 in existence as of the date of this regulation and does not include later
159 amendments.

160 "Household waste" means any solid waste generated by households, including single and
161 multiple residences, and motels, bunkhouses, ranger stations, crew quarters, campgrounds,
162 picnic grounds, and day use recreation areas.

163 "Land application" means the beneficial use method by which E&P wastes, biosolids, or other
164 water treatment residuals are spread upon or sometimes mixed into soils.

165 "Land treatment" means the treatment method by which E&P waste is applied to soils and treated
166 to result in a reduction of hydrocarbon concentration by biodegradation and other natural
167 attenuation processes. Land treatment may be enhanced by tilling, disking, aerating, composting
168 and the addition of nutrients or microbes.

169 "Municipal solid waste landfill (MSWLF)" means a sanitary landfill where one of the main waste
170 streams accepted is municipal waste.

171 "Natural background" See Background Radiation.

172 "Naturally occurring radioactive material" (NORM) means any nuclide that is radioactive in its
173 natural physical state and is not manufactured. "Naturally occurring radioactive material" does not
174 include source material, special nuclear material, byproduct material, or by-products of fossil-fuel
175 combustion, including bottom ash, fly ash, and flue-gas emission by-products.

Commented [GJ6]: Definition taken from 6 CCR 1007-1 Part 01 and 25-11-101, CRS.

176 "Oil and gas facility" means equipment or improvements used or installed at an oil and gas
177 location for the exploration, production, withdrawal, treatment, or processing of crude oil,
178 condensate, E&P waste, or gas.

179 "Oil and gas operation" means exploring for oil and gas, including conducting seismic operations
180 and the drilling of test bores; siting, drilling, deepening, recompleting, reworking, plugging, or

- 181 abandoning a well; producing operations related to any well, including installing flowlines; the
182 generating, transporting, storing, treating, or disposing exploration and production wastes; and
183 any constructing, site preparing, or reclaiming activities associated with such operations.
- 184 “Oily waste” means those materials containing crude oil, condensate or other E&P waste, such
185 as soil, frac sand, tank bottoms, and pit sludge that contain hydrocarbons.
- 186 “Pipeline” means a flowline or gathering line.
- 187 “Pit” means any natural or man-made depression in the ground used for oil or gas exploration or
188 production purposes. Pit does not include steel, fiberglass, concrete or other similar vessels
189 which do not release their contents to surrounding soils.
- 190 “Produced fluids” mean all fluids produced during flowback, initial testing, and completion of the
191 well including, but not limited to, produced water and fluids recovered during drilling, casing
192 cementing, pressure testing, completion, workover, and formation stimulation of all oil and gas
193 wells including production, exploration, injection, service and monitoring wells. Excluding crude oil
194 and natural gas.
- 195 “Produced water” means the water (brine) brought up from the hydrocarbon-bearing strata during
196 the extraction of oil and gas, and can include formation water, injection water, and any chemicals
197 added downhole or during the oil/water separation process.
- 198 “Publicly Owned Treatment Works” or “POTW” means a publicly owned domestic wastewater
199 treatment facility. This includes any publicly owned devices and systems used in the storage,
200 treatment, recycling or reclamation of municipal sewage or treatment of industrial wastes of a
201 liquid nature. It also includes sewers, pipes and other conveyances if they are publicly owned or if
202 they convey wastewater to a POTW treatment plant. The term also means the municipality as
203 defined in Section 502(4) of the Clean Water Act, which has jurisdiction over the indirect
204 discharges to and the discharge from such a treatment works.
- 205 “POTW Treatment Plant” means that portion of the POTW which is designed to provide treatment
206 (including recycling and reclamation) of municipal sewage and industrial waste.
- 207 “Registered material” means TENORM materials, managed by a person registered as per Section
208 20.5 of this Part, that are not exempt from this Part as per Section 20.4 and are not subject to a
209 specific radioactive materials license as per Section 20.13.
- 210 “Release” means any unauthorized discharge of TENORM to the environment over time.
- 211 “Sanitary landfill” means a discrete area of land or an excavation for which the final disposal of
212 solid waste employs a method to obtain the most dense volume practicable of the waste and
213 covering with earth or other suitable material. A sanitary landfill may receive household waste,
214 community waste, municipal solid waste, commercial waste, and industrial waste.
- 215 “Scale” means a mineral salt deposit that may occur on wellbore tubulars or pipes and
216 components as the saturation of produced fluid is affected by changing temperature and pressure
217 conditions in production conduit. Typical scales are calcium carbonate, calcium sulfate, barium
218 sulfate or barite, strontium sulfate, iron sulfide, iron oxides, iron carbonate, the various silicates

219 and phosphates and oxides, or any of a number of compounds insoluble or slightly soluble in
220 water.

221 "Spill" means any unauthorized sudden discharge of TENORM to the environment.

222 "Solid waste disposal site and facility" means the location and/or facility at which the deposit and
223 final treatment of solid wastes occur.

Commented [GJ7]: Definition taken from 6 CCR 1007-2 Part 1

224 "Source material" means uranium or thorium, or any combination of uranium or thorium, in any
225 physical or chemical form, including ores that contain, by weight, one-twentieth of 1 percent (0.05
226 percent) or more, of uranium, thorium or any combination thereof. Source material does not
227 include special nuclear material.

Commented [GJ8]: Definition taken from 6 CCR 1007-1 Part 01 and 25-11-101, CRS.

228 "Tank" means a stationary vessel constructed of non-earthen materials (e.g concrete, steel,
229 plastic) that provides structural support and is designed and operated to store produced fluids or
230 E&P waste. Examples include, but are not limited to, condensate tanks, crude oil tanks, and
231 produced water tanks.

232 "Tank bottom" means extraneous materials which may settle to the bottoms of tanks.

233 "Technologically enhanced naturally occurring radioactive material" (TENORM) means naturally
234 occurring radioactive material whose radionuclide concentrations are increased by or as a result
235 of past or present human practices. "TENORM" does not include:

236 A. Background radiation or the natural radioactivity of rocks or soils;

237 B. "Byproduct material" or "source material", as defined by Colorado statute or rule;
238 or

239 C. Enriched or depleted uranium as defined by Colorado or federal statute or rule.

Commented [GJ9]: Definition taken from 6 CCR 1007-1 Part 01 and 25-11-201, CRS.

240 "TENORM Radionuclides" means Radium-226, Radium-228, Lead-210, and Polonium-210.

Commented [GJ10]: To avoid confusion, created by direct analysis availability and other issues, this isotope has been removed from the rule in its entirety. Analysis and tracking of Po-210 and Pb-210 will provide adequate assurance that Bi-210 is not in excess of the originally proposed limits and will not present any additional hazard.

241 20.3 General Provisions

242 20.3.1 Unless otherwise specified, concentration limits within this Part shall be in dry weight and
243 exclude natural background.

244 A. Acceptable Natural Background values are either:

245 1. Established by the department and may be found on the division's
246 website; or

247 2. For generation, disposal, or beneficial use sites, site specific values may
248 be established and employed. An adequate and acceptable background
249 sample set will provide a mean within +/- 20% of the true average at the
250 95% confidence level.

Commented [GJ11]: The department will provide specific guidance on sample number and calculation worksheets on our website.

- 251 B. Dry weight refers to the mass of a material excluding the mass of any water or
252 moisture present within the material.
- 253 1. For the purposes of liquid TENORM sample analysis, unfiltered (total)
254 samples which include both suspended and dissolved solids must be
255 analyzed for activity and shall represent the total dry weight mass of the
256 sample.
- 257 2. Dry weight concentration values shall be expressed in units of activity
258 per mass, most commonly picocuries per gram.

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264 20.3.2 Any person who generates a waste, residual product, or other material by way of a
265 process that has the potential to increase the concentration of NORM and as a result
266 may contain concentrated naturally occurring radionuclides must make a TENORM
267 determination to evaluate whether that material is subject to the applicable requirements
268 established in this Part, or if it can be exempted from the requirements according to
269 Section 20.4 of this Part. The TENORM determination shall be made as follows:

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273 A. The TENORM determination for each material must be made at the point of
274 generation, and at any time in the course of its management that it has, or may
275 have, changed its properties or naturally occurring radionuclide concentration as
276 a result of the processes that generated the materials or other factors that may
277 change the properties of the materials such that the TENORM classification of
278 the material may change.

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281 B. A person shall use knowledge of the material when making this determination.
282 Acceptable knowledge may include material origin, composition, process
283 knowledge (e.g., radiological, chemical, or physical characterization of
284 feedstocks and other inputs to the production process, including the exclusion of

Commented [GJ12]: Dry weight concentration limits are used universally in order to consistently and adequately assess the potential impact from these materials. Recognizing that the sample results in dry weight may not represent the materials as they exist when generated, the department has evaluated potential dose to receptors using realistic modelling scenarios to account for the dispersion of these materials in their common matrices and has accounted for the potential shielding and exposure rate reduction that is provided by the moisture content of the materials. Guidance will be provided on different methods of determining Dry Weight Concentrations for characterization and compliance determination purposes.

Commented [GJ13]: If an exempt determination is made no further action is required unless there is reason to suspect that the NORM concentrations within the materials have changed, such as a result of a process change or a change to the raw materials involved in the process.

Commented [GJ14]: Please note that the presence of NORM alone does not constitute TENORM. The purpose of this section is to make a determination regarding the extent to which NORM is concentrated within a material and which regulatory requirements will apply to the material.

The first step is to establish that a process has the potential to increase concentrations of the radioactive constituents.

Commented [GJ15]: The department's expectations are that determinations are made at the point at which the materials are generated, are no longer in process, and are under the control of the generator. Additionally, the materials need to be reasonably readily accessible. The department will be developing guidance with the input of industry and related stakeholders to establish acceptable sampling points for those who generate potential TENORM. Additionally, the ability to create waste or material profiles over time is acceptable and will be encouraged for those processes that are ongoing and generate a reasonably consistent material. Adequate frequency of verification sampling will be included in guidance.

285 one or more TENORM radionuclides from consideration based on that
286 knowledge); knowledge of products, by-products, and intermediates produced by
287 the process; information on the radiological, chemical, and physical properties of
288 the materials used or produced by the process or otherwise contained in the
289 generated materials; proper characterization of the materials that illustrates the
290 radiological concentrations of TENORM radionuclides within the generated
291 materials; or other reliable and relevant information about the radiological
292 properties of the generated materials (all of which may be used to develop a
293 waste or material profile).

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296 C. Characterization of TENORM materials shall be performed using appropriate and
297 standard methods such as EPA Test Methods for Evaluating Solid Waste:
298 Physical/Chemical Methods Compendium (SW-846) or equivalent alternative
299 methods recognized by the department. Alternative characterization methods
300 may be submitted to the department for review and approval. Approved
301 alternatives will be maintained within department guidance and available on the
302 department website.

303 20.3.3 Any person who shall make, or cause to be made, surveys of areas or materials, or other
304 measurements which are necessary to comply with or to evaluate or determine
305 applicability of any section of this Part shall ensure that instruments and equipment used
306 for quantitative radiation measurements, for example, radiation dose rate or levels of non-
307 fixed contamination, are:

308 A. Calibrated at intervals not to exceed 12 months for the radiation measured
309 unless otherwise approved by the Department;

310 B. Are appropriate for the radiation being measured; and

311 C. Have minimum detection capabilities adequate to demonstrate compliance or
312 make a regulatory determination.

313 20.3.4 The Department may incorporate into any registration or license at the time of issuance,
314 or thereafter by appropriate rule, regulation, or order, such additional requirements and
315 conditions with respect to the licensee or registrant's receipt, possession, use, transfer, or
316 disposal of radioactive material subject to this Part, as it deems appropriate or necessary
317 in order to:

318 A. Minimize danger to public health and safety, workers, or property; and

319 B. Prevent loss or theft of material subject to this Part.

320 20.4 Exemptions.

Commented [GJ16]: This section will specifically allow for the use of industry knowledge as well data other than just radiological sample data to make a determination. The department will work with industry to provide guidance on acceptable considerations and determinations. This will include establishing which radionuclides are to be considered for each material type, e.g. Pb and Po are important for natural gas waste but may be excluded from analyses of drinking water or waste water treatment residuals.

Commented [GJ17]: The department will be providing specific guidance on acceptable lab methods as well as sample data analysis in the form of a spreadsheet for statistically verifying adequate characterization as per SW-846 methods and will include an evaluation of appropriate number of samples and TENORM concentration versus regulatory thresholds such as exempt concentrations or upper limits of registration. Additionally, acceptable alternative methods of radiological characterization will be maintained in guidance.

321 TENORM materials that qualify for exemption in accordance with any one of the following
322 exemption categories are exempt from this rule and do not need to meet the
323 requirements of any other exemption category.

324 20.4.1 Exempt Concentrations.

325 A. Persons who generate, handle, process, transfer, receive, transport, dispose of,
326 possess, distribute, or beneficially use TENORM are exempt from the
327 requirements of this part if the materials contain or are contaminated at
328 concentrations in dry weight not in excess of those listed in Table 20 – 1
329 excluding natural background. The radioactive progeny of the isotopes present
330 in exempt TENORM are also exempt.

331 **Table 20 – 1**
332 **Exempt TENORM Concentrations**
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Isotope	Picocuries/gram (pCi/g)
Radium-226	5
Radium-228	5
Lead-210	5
Polonium-210	5

335 20.4.2 Exempt Quantities.

336 A. Persons who generate, handle, process, transfer, receive, transport, dispose of,
337 possess, distribute, or beneficially use TENORM are exempt from the
338 requirements of this part if the materials are in individual quantities each of which
339 does not exceed the applicable quantity set forth in Table 20 – 2. The
340 radioactive progeny of the isotopes present in exempt TENORM are also
341 exempt.

342 **Table 20 – 2**
343 **Exempt TENORM Quantities**
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Isotope	Microcuries (µCi)
Radium-226	0.1
Radium-228	0.1
Lead-210	0.1
Polonium-210	0.1

346 20.4.3 Household waste containing TENORM is exempt from the requirements of this Part.

347 20.4.4 Consumer goods or products such as tobacco products or building materials are exempt
348 from the requirements of this Part.

349 20.4.5 Waste pipe generated by oil and gas exploration and production, midstream, or
350 downstream related activities or by other industrial activities that may contain TENORM
351 as scale shall be exempt from this Part if:

352 A. The pipe is no longer than 50 feet in length, or the pipe is cut to individual
353 sections no longer than 50 feet in length; and

354 B. Each pipe section exhibits no measured radiation dose rate distinguishable from
355 natural background when measured on contact with both the exterior surface and
356 each accessible surface of the interior of the pipe section with a portable
357 radiation detector; and

358 C. For each pipe section used for transfer or processing of natural gas, the level of
359 non-fixed alpha contamination of each accessible interior surface does not
360 exceed 600 disintegrations per minute per 100 square centimeters (600 dpm/100
361 cm2).

362 20.4.6 Transportation: Common and contract carriers, freight forwarders, and warehouse
363 workers which are subject to the requirements of the DOT in 49 CFR 170 through 189, or
364 the U.S. Postal Service in the Postal Service Manual (Domestic Mail Manual), are exempt
365 from the requirements of this Part to the extent that they transport or store radioactive
366 material in the regular course of their carriage for others or storage incident thereto.

367 20.4.7 The Department may, upon application or upon its own initiative, grant an exemption or
368 exception from any requirement in this Part as it determines is authorized by law and will
369 not result in undue hazard to public health and safety, workers, or property.

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372 20.4.8 No person may, for purposes of rendering materials exempt under the requirements of
373 Section 20.4, purposefully dilute TENORM to reduce the concentration of radionuclides
374 contained within the materials or subdivide TENORM material to reduce the quantity of
375 radionuclides contained within the materials below the exempt limits. Operations which
376 are routine, state of practice, and common within an industry or are required for purposes
377 of the activity being conducted which may inadvertently reduce the concentration of
378 TENORM but are not performed for the express purpose of rendering a material exempt
379 are not prohibited.

380 **Registration**

381 **20.5 Persons who generate, handle, process, transfer, receive, transport, dispose of,**
382 **possess, distribute, or beneficially use TENORM not exempt from this Part as per**
383 **Section 20.4 and not subject to a specific radioactive materials license as per**
384 **Section 20.13 shall register with the Department. TENORM materials that are**
385 **included within a specific radioactive materials license authorization do not require**
386 **registration under this section. A registrant may capture multiple activities**

Commented [GJ18]: The department will be issuing specific guidance on the method in which this may be determined to include a 300 square centimeter wipe of the accessible interior surface. The determination and sampling can be done in a number of ways, the individual in possession may be able to make this determination themselves using department approved survey and analysis techniques or they may choose only to swipe the material and send the sample to a lab, or another option would be to hire a service provider or consultant to make the determination or perform the swipe to be analyzed at a laboratory. Finally, if there are alternative methods suggested of establishing that the removable alpha contamination does not exceed the standard those may be approved and included in department guidance. ANSI N.13.12, Surface and Volume Radioactivity Standards for Clearance, 2013 Edition and N13.53, Control and Release of Technologically Enhanced Naturally Occurring Radioactive Material (TENORM), 2009 Edition were employed in developing this standard.

Commented [GJ19]: This may apply to an entity who is subject to registration. Additionally, if the department grants a general case type exemption, that will be included in guidance until such time as it can be incorporated into the rule.

Commented [GJ20]: Comingling or combining identical or similar wastes at a facility for disposal as part of routine operations would not be considered purposeful dilution if it is a common practice. Additionally, if there is a process within a larger operation, such as adding alum to a material to capture or sequester a constituent, which is common practice and necessary to the operation but may reduce overall TENORM concentration due to the addition of mass to the system, this would not be prohibited.

Commented [GJ21]: Please Note: The intention of registration is to capture information on those entities who generate or are in possession of TENORM, provide a framework within which they may operate, and ensure that the materials are disposed of properly, all the while allowing for routine operations to continue and providing a high level of confidence that no members of the public including workers exceed the 100 mrem annual dose standard. Additionally, the department will be developing concise registration forms to minimize the burden on registrants when providing registration information.

387 (generation, beneficial use, acceptance for disposal, etc.) and types of Non-Exempt
388 TENORM materials under one registration.

389 20.5.1 All persons subject to registration shall register annually with the Department and shall
390 pay the fee required by 6 CCR 1007-1 Part 12.

391 A. Initial registration shall take place within 90 days of any activity which requires
392 registration per Section 20.5.

393 B. The registrant shall furnish the following information and any other information
394 specifically requested by the Department:

395 1. Name and mailing address;

396 2. Name, title, telephone number, and email address of the responsible
397 person designated as a representative of the registrant;

398 3. Address or location information, including the Public Land Survey
399 System (PLSS) Township/Range, Section, and Quarter-Quarter Section
400 (Lot/Tract), at which the TENORM is located;

401 4. Registrant type or a description of the process or activity that generates
402 the TENORM. A registrant may include multiple types of activities within
403 one registration;

404 5. A description of the TENORM including the amount or volume and the
405 concentrations of TENORM radionuclides present within the material;

406 6. A description of any routine or non-routine maintenance that involves the
407 manipulation or handling of the TENORM;

408 7. Certification by the responsible representative of the registrant that they
409 are aware of the requirements of this Part and will meet all of the
410 applicable requirements.

411 20.5.2 General Requirements - Any person subject to registration per Section 20.5:

412 A. Shall not abandon such TENORM.

413 B. Shall secure registered materials from unauthorized removal or access, with the
414 exception of those materials land applied for beneficial use in accordance with
415 this Part.

416 C. Shall transfer TENORM in accordance with this Part.

417 D. Shall maintain records in accordance with Section 20.10 of this Part.

418 E. Shall ensure that registered materials that have been packaged or containerized
419 for transfer or disposal as per this Part shall bear a durable, clearly visible label

Commented [GJ22]: For example: One entity may both generate materials and beneficially use materials, i.e. generate biosolids and then apply those biosolids to land, under one registration. One entity may also generate materials in more than one method, i.e. drinking water treatment and wastewater treatment, under one registration.

Commented [GJ23]: A registrant may be a generator, a beneficial user, a disposal facility, or another type of registrant at the same time or any combination of types.

420 bearing the radiation symbol prescribed in 6 CCR 1007-1 Part 4, Section 4.27
421 and the words "CAUTION, RADIOACTIVE MATERIAL" when in storage awaiting
422 transfer or disposal.

423 F. Is subject to the provisions in Sections 4.51 and 4.52 of 6 CCR 1007-1 Part 4 for
424 reporting radiation incidents, theft, or loss of registered material but shall be
425 exempt from the other requirements of 6 CCR 1007-1 Part 4 unless otherwise
426 required by this Part. This exemption does not apply to any person who also
427 holds a specific radioactive materials license issued by the Department.

428 G. Is subject to the provisions in Section 10.5.1 of 6 CCR 1007-1 Part 10 but shall
429 be exempt from the other requirements in 6 CCR 1007-1 Part 10. This exemption
430 does not apply to any person who also holds a specific radioactive materials
431 license issued by the Department.

432 H. Shall only allow employees or contractors under the control and supervision of a
433 registrant to perform routine maintenance on equipment, facilities, and land
434 owned or controlled by the registrant. Maintenance that provides a pathway for
435 exposure different from that found in routine periodic maintenance operations or
436 that increases the potential for additional exposure is not considered routine
437 maintenance and shall not be conducted without a specific radioactive materials
438 license or specific written approval from the department.

439 I. Shall conduct activities so as to minimize contamination of the facility and the
440 environment. When activities involving such TENORM are permanently ceased
441 at any site, if evidence of residual TENORM is identified, the registrant shall
442 notify the Department about such material and may consult with the Department
443 as to the appropriateness of sampling and restoration activities to ensure that
444 any contamination or residual TENORM remaining at the site where registered
445 TENORM was used does not exceed the limits in Table 20-1 or is not likely to
446 result in exposures that exceed the limits in Section 4.61.2 of 6 CCR 1007-1 Part
447 4. Institutional controls may be required if compliance with Table 20-1 or the
448 limits in Section 4.61.2 of 6 CCR 1007-1 Part 4 is not feasible.

449 J. Is prohibited from administering TENORM, or the radiation therefrom, either
450 externally or internally, to human beings except as may be authorized in a
451 specific radioactive materials license.

452 K. Shall respond to written requests from the Department to provide information
453 relating to the registration within 30 calendar days of the date of the request, or
454 other time specified in the request.

455 1. If the registrant cannot provide the requested information within the
456 allotted time, it shall, within that same time period, request a longer
457 period to supply the information by providing the Radiation Control
458 Program Manager a written justification for the request.

Commented [GJ24]: Items such as drums, roll off containers, dumpsters and other packages or containers that wastes are placed in prior to transfer should be labeled as required by this item.

Commented [GJ25]: The concept of administering radioactive material or radiation to a human being is found in and commonly used in multiple portions of the Colorado regulations and Federal regulations and is referring to applications to the human body with the intention to illicit an effect on the body, such as medical applications. This language is not intended to prohibit the transfer of materials in accord with the rule.

- 459 L. Shall appoint an individual responsible for having knowledge of the appropriate
460 regulations and requirements and the authority for taking required actions to
461 comply with appropriate regulations and requirements.
- 462 1. The registrant, through this individual, shall ensure the day-to-day
463 compliance with appropriate regulations and requirements; this
464 appointment does not relieve the registrant of any of its responsibility in
465 this regard.
- 466 M. Is subject to all other applicable portions of this Part and any limitations of the
467 registration.
- 468 N. Is subject to the provisions of 49 CFR Subtitle B. Chapter I. Subchapter C. when
469 transporting registered material outside the registered site or where transport is
470 on public highways, or who delivers licensed material to a carrier for transport.
- 471 O. Shall not introduce registered material into a consumer good or product except
472 as specifically allowed by this Part.
- 473 P. Shall, when operating as a solid waste disposal site and facility, incorporate each
474 TENORM radionuclide present within the registered materials into monitoring and
475 closure plans required by 6 CCR 1007-2 Part 1.
- 476 20.5.3 Training requirements. All persons subject to registration shall meet the following
477 requirements.
- 478 A. All employed individuals whose assigned activities during normal and abnormal
479 situations may involve exposure to registered TENORM or radiation resulting
480 from that material which can reasonably be expected to occur during the life of a
481 registered facility shall be instructed in the following topics:
- 482 1. The storage, transfer, or use of sources of radiation;
- 483 2. General awareness in the health protection problems associated with
484 exposure to radiation and/or radioactive material to the individual and the
485 potential offspring, designed to enable the employee to recognize and
486 identify exposure to radiation and/or radioactive material;
- 487 3. Requirements of this Part that are specifically applicable to the functions
488 or activities the employee performs;
- 489 4. The employee's responsibility to observe, to the extent within the
490 worker's control, the applicable provisions of the Radiation Control Act, 6
491 CCR 1007-1, this Part and specific measures the employer has
492 implemented for the protection of personnel from exposures to radiation
493 or radioactive material;
- 494 5. The employee's responsibility to report promptly to the registrant any
495 condition which may constitute, lead to, or cause a violation of this Part

Commented [GJ26]: No certification is required, the registrant is required to identify an individual who will be responsible to act as a representative of the registrant to the department and will be familiar with the requirements applicable to the registrant. This individual may be a permanent employee or a consultant.

Commented [GJ27]: The department will be issuing guidance to assist with transportation regulations. A significant portion of registered TENORM may be exempt from the DOT regulations based on the 49CFR173.403 Definition of radioactive material.

Commented [GJ28]: This applies to those solid waste facilities that have a Section 9 impoundment or perform any other activities that require monitoring or closure plans as per the solid waste regulations.

Commented [GJ29]: The department will be issuing guidance regarding training. The guidance will be developed with industry in order to best communicate expectations regarding the level of training commensurate with activities and the training content.

- 496 and registrations, or unnecessary exposure to radiation and/or
497 radioactive material;
- 498 6. Methods and procedures for avoiding incidents; and
- 499 7. Emergency response information, including the appropriate response to
500 warnings made in the event of any unusual occurrence or malfunction
501 that may involve exposure to radiation and/or radioactive material, and
502 the procedures for mitigating any spill or release.
- 503 B. The extent of these instructions shall be commensurate with potential radiological
504 health effects associated with assigned work and present in the work place.
- 505 C. Training frequency:
- 506 1. Initial training. A new employee, or an employee who changes job
507 functions involving exposure to radiation or radioactive material may
508 perform those functions prior to the completion of training provided:
- 509 a. The employee performs those functions under the direct
510 supervision of a properly trained and knowledgeable employee;
511 and
- 512 b. The training is completed within 90 days after employment or a
513 change in job function.
- 514 2. Refresher training. An employee must receive the training required by
515 this Part at least once every three years.
- 516 D. Trainings received from a previous employer or other source may be used to
517 satisfy the requirements of this Part provided a current record of training is
518 obtained from the employees' previous employer or other source and the training
519 is pertinent and applicable to the employees current job function.
- 520 E. Each registrant is responsible for compliance with the requirements of this Part
521 regardless of whether the training required by this subpart has been completed.
- 522 F. Each registrant must create and maintain employee training record in
523 accordance with Section20.10.4.
- 524 20.5.4 Spill and release requirements.
- 525 A. Registrants shall, immediately upon discovery, control and contain all
526 spills/releases of Non-Exempt TENORM.
- 527 B. Registrants shall investigate and remediate impacts resulting from spills/releases
528 as soon as practicable.
- 529 C. Reporting.

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1. Oil and Gas exploration and production registrants that are subject to the spill and release reporting requirements of 2 CCR 404-1 shall provide copies of all reports required by 2 CCR 404-1 Rule 906 regarding a spill/release of registered TENORM. These shall be provided to the department no later than 24 hours after they are submitted to the Oil and Gas Conservation Commission of the State of Colorado (COGCC).
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- a. The report required by 2 CCR 404-1 Rule 906 shall include information available to the registrant about the type, isotopes, concentration, and volume of TENORM involved, including whether it is controlled or uncontrolled at the time of submitting the initial report.
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2. All other registrants shall make an initial notification to the department as soon as practicable upon discovery of a spill or release in which Non-Exempt TENORM containing 10 μ Ci or more of Radium-226, Radium-228, Lead-210, or Polonium-210 is spilled or released, and shall provide an initial written report no more than seven days after such a discovery.
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- a. The initial written report of a spill/release shall include, at a minimum, the location of spill/release, the type and volume of TENORM involved in the spill/release, the actions that have been taken to control or contain such spill/release, the disposal of spill/release impacted material, and the plan and schedule to prevent any future spill/release.
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- D. Upon receipt of the initial notification or the initial written report, the department may require a site investigation and remediation work plan for review and approval when a spill/release results in any of the following conditions:
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1. Soil contamination in excess of 5 pCi/g above natural background
2. Groundwater or surface water impacts in excess of WQCC standards
3. The potential for any individual to exceed an annual dose of 100 millirem
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- E. Site investigation and remediation work plans shall, at minimum, address the following:
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1. Sampling and analysis to determine the extent of contamination in soil, surface water, and groundwater
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2. Remedial activities including either a radiological dose estimate demonstrating that no individual will exceed an annual dose of 100 millirem or information on the individuals authorized to perform such operations under terms of a specific radioactive materials license or equivalent licensing document, issued by the Department, NRC or any Agreement State.

- 568 3. Access control to the impacted area
- 569 4. Schedule for remedial activities to be conducted and complete
- 570 5. Waste management

571 **Registrant Types and Restrictions**

572 **20.6 Registration as a TENORM Generator**

573 20.6.1 Oil and Gas Registrants. Non-Exempt TENORM generated by Oil and Gas exploration
574 and production, as well as midstream and downstream activities, including those
575 materials generated at a centralized E&P waste management facility shall be registered
576 and are subject to the requirements and limitations as follows:

577 A. All activities involving Non-Exempt TENORM generated by Oil and Gas
578 exploration and production activities shall meet the applicable requirements of 2
579 CCR 404-1 in addition to the requirements of this part.

580 B. Produced Fluids.

581 1. Registrants may possess produced fluids that contain or are
582 contaminated at concentrations, excluding natural background, greater
583 than 5 pCi/g but not in excess of 250 pCi/g each in dry weight of Radium-
584 226, Radium-228, Lead-210, and Polonium-210.

585 2. Disposal. Registered produced fluids may only be disposed of as follows:

586 a. Injection into a Class II well permitted in accordance with 2 CCR
587 404-1, Rule 325 and registered with the department in
588 accordance with this Part;

589 b. Disposal at commercial solid waste disposal facility registered
590 with the department in accordance with this Part;

591 c. Discharging into state waters, in accordance with the Water
592 Quality Control Act, the rules and regulations promulgated
593 thereunder and 2 CCR 404-1, Rule 907.

594 d. Evaporation in a properly lined pit at a centralized E&P waste
595 management facility permitted in accordance with 2 CCR 404-1,
596 Rules 907 and 908 and registered with the department in
597 accordance with this Part.

598 e. Disposal at a facility authorized to receive such material under
599 terms of a specific radioactive materials license, a Part 20
600 TENORM registration, or equivalent licensing document, issued
601 by the Department, NRC or any Agreement State, or to any
602 person otherwise authorized to receive such material by the

Commented [GJ30]: Please note that the concentration limitations specific to different waste types and activities were determined by employing models and calculations to establish potential radiological dose. These scenarios took into account the different types of activities, physical conditions, and the likely physical form of the materials, i.e. produced fluids are typically in liquid form containing significant dissolved and suspended solids whereas a drinking water treatment residual may be a liquid with very little dissolved and suspended solids or more of a sludge and have significantly more solids content. Models assessed exposure rates from these materials as they would exist in operations typical to the industry in which they are produced.

Commented [GJ31]: To avoid confusion, created by direct analysis availability issues, this isotope has been removed from the rule in its entirety. Analysis and tracking of Po-210 and Pb-210 will provide adequate assurance that Bi-210 is not in excess of the originally proposed limits and will not present any additional hazard.

603 Federal Government or any agency thereof, the Department, or
604 an Agreement State.

605 3. Registrants in possession of produced fluids that contain or are
606 contaminated at concentrations, excluding natural background, in dry
607 weight in excess of 50 pCi/g of any TENORM Radionuclide and contain
608 greater than 10% solids (or are less than 90% moisture content):

609 a. Shall confine these produced fluids to closed tanks, pipes,
610 transfer lines or any other containment that prevents physical
611 access to the materials.

612 b. Shall prohibit any physical access to or handling of these
613 produced fluids outside of containment by unauthorized persons.
614 These activities shall only be performed by individuals authorized
615 to perform such operations under terms of a specific radioactive
616 materials license or equivalent licensing document, issued by the
617 Department, NRC or any Agreement State. The registrant may
618 seek to obtain a specific radioactive materials license to perform
619 these activities or may use a specifically licensed service
620 provider authorized for these activities.

621 c. Shall not reuse these produced fluids for enhanced recovery,
622 drilling, or any other use.

623 d. Shall only transfer these materials for disposal.

624 4. Reuse and Recycling

625 a. Produced water may be reused for enhanced recovery, drilling,
626 and other approved uses in a manner consistent with existing
627 water rights and in consideration of water quality standards and
628 classifications established by the Water Quality Control
629 Commission (WQCC) for waters of the state, or any point of
630 compliance established by the Director pursuant to 2 CCR 404-
631 1, Rule 324D.

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633 C. Oily Waste. Registrants may possess oily waste that contain or are contaminated
634 at concentrations, excluding natural background, not in excess of 50 pCi/g each
635 in dry weight of Radium-226, Radium-228, Lead-210, and Polonium-210.

636 1. Disposal. Oily wastes may only be disposed of as follows:

637 a. Disposal at commercial solid waste disposal facility registered
638 with the department in accordance with this Part;

Commented [GJ32]: This section was removed after a review of the TENORM report and consultation with other state regulatory agencies as well as multiple stakeholders. CDPHE has determined that drill cuttings do not meet the definition of TENORM and as a result the drilling fluids which act as a carrier of the cuttings will not be included in this section.

Commented [GJ33]: Please note that while oily waste may refer to a number of different waste types the rule only applies to those oily wastes which can reasonably be expected to be a result of processes that have the potential to concentrate NORM and therefore be TENORM. The intent of this section is not to imply that all oily wastes are TENORM but rather to provide a framework for handling and disposing of those oily wastes that have specifically been determined to be TENORM.

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- b. Land treatment or land application at a centralized E&P waste management facility permitted in accordance with 2 CCR 404-1, Rules 908 and registered with the department in accordance with this Part.
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- c. Disposal at a facility authorized to receive such material under terms of a specific radioactive materials license, a Part 20 TENORM registration, or equivalent licensing document, issued by the Department, NRC or any Agreement State, or to any person otherwise authorized to receive such material by the Federal Government or any agency thereof, the Department, or an Agreement State.
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- D. Pigging Waste. Registrants may possess pigging waste from natural gas pipelines that contain or are contaminated at concentrations, excluding natural background, not in excess of 500 pCi/g each in dry weight of Lead-210, and Polonium-210.
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1. Wastes from natural gas pipelines shall be:
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- a. Characterized at minimum for their Lead-210 content.
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- b. Maintained moist to prevent creation or dispersion of particulate materials
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- c. Subject to Section 20.6.1.H. of this Part if they are determined to be a Hazardous Waste.
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2. Limitations:
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- a. Pigging Operations: If pigging wastes are determined to contain or are contaminated at concentrations, excluding natural background, in excess of 50 pCi/g in dry weight of either Lead-210, or Polonium-210, all pigging operations involving those wastes outside of the pipeline shall be performed by individuals authorized to perform such operations under terms of a specific radioactive materials license or equivalent licensing document, issued by the Department, NRC or any Agreement State. The registrant may seek to obtain a specific radioactive materials license to perform these activities or may use a specifically licensed service provider authorized for these activities;
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3. Disposal. Pigging wastes may only be disposed of as follows, except for Hazardous Wastes which shall meet Section 20.6.1.H.:
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- a. Disposal at commercial solid waste disposal facility registered with the department in accordance with this Part;

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- b. Injection into a Class II well permitted in accordance with 2 CCR 404-1, Rule 325 and registered with the department in accordance with this Part.
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- c. Disposal at a facility authorized to receive such material under terms of a specific radioactive materials license, a Part 20 TENORM registration, or equivalent licensing document, issued by the Department, NRC or any Agreement State, or to any person otherwise authorized to receive such material by the Federal Government or any agency thereof, the Department, or an Agreement State.
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- E. Filter Socks. Registrants may possess filter socks that contain or are contaminated at concentrations, excluding natural background, not in excess of 500 pCi/g each in dry weight of Radium-226, Radium-228, Lead-210, and Polonium-210.
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1. Disposal. Filter socks may only be disposed of as follows:
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- a. Disposal at commercial solid waste disposal facility registered with the department in accordance with this Part;
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- b. Disposal at a facility authorized to receive such material under terms of a specific radioactive materials license, a Part 20 TENORM registration, or equivalent licensing document, issued by the Department, NRC or any Agreement State, or to any person otherwise authorized to receive such material by the Federal Government or any agency thereof, the Department, or an Agreement State.
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2. Handling. Registrants shall limit direct handling of filter socks to removal from filter housing, placement on gravity separation equipment, and placement in waste containers. All other direct handling, manipulation, or any other activities that would provide an exposure pathway different from that found in routine handling operations shall be performed by individuals authorized to perform such operations under terms of a specific radioactive materials license or equivalent licensing document, issued by the Department, NRC or any Agreement State. The registrant may seek to obtain a specific radioactive materials license to perform these activities or may use a specifically licensed service provider authorized for these activities.
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3. Registrants in possession of materials that contain or are contaminated at concentrations, excluding natural background, in dry weight in excess of 50 pCi/g of any TENORM Radionuclide shall additionally:
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- a. Maintain such materials in containment such that no individual may directly handle (with the exception of removal from filter housing, placement on gravity separation equipment, or

- 717 placement in waste containers), physically interact with, or
718 become contaminated with those materials and to prevent
719 dispersion outside of the containment during operations or
720 storage;
- 721 b. Conduct indoor air radon monitoring if materials are located in an
722 occupied indoor workspace.
- 723 (1) Monitoring shall be performed during periods of normal
724 operation and repeated if there is a significant increase
725 in the quantity of registered materials contained within
726 the workspace.
- 727 (2) Documentation of monitoring shall be maintained by the
728 registrant and shall demonstrate that average indoor
729 radon levels are not in excess of the U.S. Environmental
730 Protection Agency's 4 pCi/L radon action level.
- 731 (3) If monitoring results indicate levels in excess of the 4
732 pCi/L action level, the work area shall be restricted from
733 regular occupancy until mitigation action is taken and
734 monitoring demonstrates that average indoor radon
735 levels are below 4 pCi/L.
- 736 c. Conduct radiation dose rate surveys.
- 737 (1) Radiation dose rates shall not exceed 2 millirem/hour at
738 30 centimeters from the source of radiation or from any
739 surface that the radiation penetrates in any space that
740 can be accessed or occupied by facility personnel
- 741 (2) Registered material shall be stored only in an area
742 controlled by the registrant and shall not cause radiation
743 dose rates at or beyond the boundary of that controlled
744 area greater than 11 microrem/hour excluding natural
745 background.
- 746 (3) Registered material that exhibits a measured radiation
747 dose rate which exceeds 50 microrem/hour at 30
748 centimeters excluding natural background shall be:
- 749 (a) Cordoned off with a physical barrier at a
750 distance that ensures that radiation dose rates
751 at or beyond the boundary of that barrier shall
752 not exceed 50 microrem/hour excluding natural
753 background.
- 754 (b) Labelled at the barrier with a durable, clearly
755 visible label bearing the radiation symbol

756 prescribed in 6 CCR 1007-1 Part 4, Section 4.27
757 and the words "CAUTION, RADIOACTIVE
758 MATERIAL".

759 (c) Managed such that no individual handles these
760 materials or accesses the cordoned off area for
761 a period of time in excess of 50 hours in a year.

762 (d) The registrant shall keep a record of all
763 individuals accessing or handling these
764 materials which shall contain at a minimum; the
765 name of the individual; the date; the length of
766 time in hours; and a year to date total number of
767 hours for the individual.

768 (e) This record shall be maintained by the registrant
769 for inspection by the department.

770 F. Pipes, Pipescale, and other Processing Equipment.

771 1. Scale. Registrants may possess waste pipe with scale deposition which
772 contains or is contaminated with Radium-226, Radium-228, Lead-210,
773 and Polonium-210 and meet the following criteria:

774 a. Pipes shall be characterized by measuring the highest radiation
775 dose rate on contact with and at 30 centimeters from both the
776 exterior surface and each accessible surface of the interior of the
777 pipe with a portable radiation detector.

778 b. Individual or collections of pipe sections shall not exhibit a
779 measured radiation dose rate which exceeds 2 millirem/hour at
780 30 centimeters from the source of radiation or from any surface
781 that the radiation penetrates.

782 c. Individual or collections of pipe sections shall be stored only in
783 an area controlled by the registrant and shall not cause radiation
784 dose rates at or beyond the boundary of that controlled area
785 greater than 11 microrem/hour excluding natural background.

786 d. Individual or collections of pipe sections that exhibit a measured
787 radiation dose rate which exceeds 50 microrem/hour at 30
788 centimeters excluding natural background shall be:

789 (1) Cordoned off with a physical barrier at a distance that
790 ensures that radiation dose rates at or beyond the
791 boundary of that barrier shall not exceed 50
792 microrem/hour excluding natural background.

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- (2) Labelled at the barrier with a durable, clearly visible label bearing the radiation symbol prescribed in 6 CCR 1007-1 Part 4, Section 4.27 and the words "CAUTION, RADIOACTIVE MATERIAL".
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- (3) Managed such that no individual handles these materials or accesses the cordoned off area for a period of time in excess of 50 hours in a year.
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- (a) The registrant shall keep a record of all individuals accessing or handling these materials which shall contain at a minimum; the name of the individual; the date; the length of time in hours; and a year to date total number of hours for the individual.
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- (b) This record shall be maintained by the registrant for inspection by the department.
- 808 e. Disposal. These waste pipes may only be disposed of as follows:
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- (1) Disposal at commercial solid waste disposal facility registered with the department in accordance with this Part;
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- (2) Disposal at a facility authorized to receive such material under terms of a specific radioactive materials license, a Part 20 TENORM registration, or equivalent licensing document, issued by the Department, NRC or any Agreement State, or to any person otherwise authorized to receive such material by the Federal Government or any agency thereof, the Department, or an Agreement State.
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- f. Reuse and Recycling. These waste pipes may only be recycled and reused by persons who are authorized for such activities under a specific radioactive materials license, a Part 20 TENORM registration, or equivalent licensing document, issued by the Department, NRC or any Agreement State.
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- g. Any removal of scales by physical or chemical methods for disposal shall be performed by individuals authorized to perform such operations under terms of a specific radioactive materials license or equivalent licensing document, issued by the Department, NRC or any Agreement State. The registrant may seek to obtain a specific radioactive materials license to perform these activities or may use a specifically licensed service provider authorized for these activities.

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2. Radon Progeny Deposits. Registrants may possess waste pipe and other processing equipment from natural gas operations with radon progeny deposits which contain or is contaminated with Lead-210, and Polonium-210 and meet the following criteria:
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- a. Pipes and other processing equipment shall be characterized by:
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- (1) Measuring the highest radiation dose rates on contact with and at 30 centimeters from both the exterior surface and each accessible surface of the interior with a portable radiation detector; and
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- (2) Measuring the level of non-fixed alpha contamination of each accessible interior surface in disintegrations per minute per 100 square centimeters.
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- b. Individual or collections of pipes or other processing equipment shall not exhibit a measured radiation dose rate which exceeds 2 millirem/hour at 30 centimeters from the source of radiation or from any surface that the radiation penetrates.
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- c. Individual or collections of pipe sections shall be stored only in an area controlled by the registrant and shall not cause radiation dose rates at or beyond the boundary of that controlled area greater than 11 microrem/hour excluding natural background.
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- d. Individual or collections of pipe sections that exhibit a measured radiation dose rate which exceeds 50 microrem/hour at 30 centimeters excluding natural background shall be:
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- (1) Cordoned off with a physical barrier at a distance that ensures that radiation dose rates at or beyond the boundary of that barrier shall not exceed 50 microrem/hour excluding natural background.
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- (2) Labelled at the barrier with a durable, clearly visible label bearing the radiation symbol prescribed in 6 CCR 1007-1 Part 4, Section 4.27 and the words "CAUTION, RADIOACTIVE MATERIAL".
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- (3) Managed such that no individual handles these materials or accesses the cordoned off area for a period of time in excess of 50 hours in a year.
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- (a) The registrant shall keep a record of all individuals accessing or handling these materials which shall contain at a minimum; the name of the individual; the date; the length of

- 871 time in hours; and a year to date total number of
872 hours for the individual.
- 873 (b) This record shall be maintained by the registrant
874 for inspection by the department.
- 875 e. Disposal. These materials may only be disposed of as follows:
- 876 (1) Disposal at commercial solid waste disposal facility
877 registered with the department in accordance with this
878 Part;
- 879 (2) Disposal at a facility authorized to receive such material
880 under terms of a specific radioactive materials license, a
881 Part 20 TENORM registration, or equivalent licensing
882 document, issued by the Department, NRC or any
883 Agreement State, or to any person otherwise authorized
884 to receive such material by the Federal Government or
885 any agency thereof, the Department, or an Agreement
886 State.
- 887 f. Reuse and Recycling. These waste pipes may only be recycled
888 and reused by persons who are authorized for such activities
889 under a specific radioactive materials license or equivalent
890 licensing document, issued by the Department, NRC or any
891 Agreement State.
- 892 g. All operations that would likely disturb the radon progeny
893 deposits and make particulates available for ingestion or
894 inhalation including, but not limited to, grinding, cutting, or other
895 abrasive processes involving items in which the level of non-
896 fixed alpha contamination exceeds 600 disintegrations per
897 minute per 100 square centimeters shall only be performed by
898 individuals authorized to perform such operations under terms of
899 a specific radioactive materials license or equivalent licensing
900 document, issued by the Department, NRC or any Agreement
901 State. The registrant may seek to obtain a specific radioactive
902 materials license to perform these activities or may use a
903 specifically licensed service provider authorized for these
904 activities.
- 905 h. Any removal of scale by physical or chemical methods for
906 disposal other than those pigging operations addressed in
907 Section 20.6.1.D shall be performed by individuals authorized to
908 perform such operations under terms of a specific radioactive
909 materials license or equivalent licensing document, issued by the
910 Department, NRC or any Agreement State. The registrant may
911 seek to obtain a specific radioactive materials license to perform

- 912 these activities or may use a specifically licensed service
913 provider authorized for these activities.
- 914 G. Other waste. Registrants may possess other E&P waste as well as other solid
915 wastes generated by oil and gas exploration and production, midstream, or
916 downstream related activities including, but not limited to, tank bottoms, filter
917 solids or cake, condensate sludges, molecular sieve residuals, amine filters,
918 water treatment residuals, and other processing and storage wastes that contain
919 or are contaminated at concentrations, excluding natural background, not in
920 excess of 50 pCi/g each in dry weight of Radium-226, Radium-228, Lead-210,
921 and Polonium-210.
- 922 1. Subject to Section 20.6.1.H of this Part if they are determined to be a
923 Hazardous Waste.
- 924 2. Disposal. These wastes may only be disposed of as follows, except for
925 Hazardous Wastes which shall meet Section 20.6.1.H:
- 926 a. Disposal at commercial solid waste disposal facility registered
927 with the department in accordance with this Part;
- 928 b. Injection into a Class II well permitted in accordance with 2 CCR
929 404-1, Rule 325 and registered with the department in
930 accordance with this Part.
- 931 c. Treatment at a Class II well permitted in accordance with 2 CCR
932 404-1 and registered with the department in accordance with this
933 Part.
- 934 d. Disposal at a facility authorized to receive such material under
935 terms of a specific radioactive materials license, a Part 20
936 TENORM registration, or equivalent licensing document, issued
937 by the Department, NRC or any Agreement State, or to any
938 person otherwise authorized to receive such material by the
939 Federal Government or any agency thereof, the Department, or
940 an Agreement State.
- 941 H. RCRA Hazardous Waste. Any hazardous waste as defined in 6 CCR 1007-3 Part
942 261 generated by oil and gas exploration and production, midstream, or
943 downstream related activities which contain Non-Exempt TENORM shall be
944 registered and are subject to the requirements and limitations as follows:
- 945 1. Registrants may possess materials that contain or are contaminated at
946 concentrations, excluding natural background, greater than 5 pCi/g but
947 not in excess of 100 pCi/g each in dry weight of Radium-226, Radium-
948 228, Lead-210, and Polonium-210.
- 949 2. Registrants in possession of materials that contain or are contaminated
950 at concentrations, excluding natural background, in dry weight in excess

- 951 of 50 pCi/g of any TENORM Radionuclide and contain greater than 10%
952 solids (or are less than 90% moisture content) shall additionally:
- 953 a. Maintain such materials in containment such that no individual
954 may physically interact with, directly handle, or become
955 contaminated with those materials and to prevent dispersion
956 outside of the containment during operations or storage;
- 957 b. Require that all direct handling, manipulation, and any other
958 activities that would provide an exposure pathway different from
959 that found in routine hazardous waste handling operations be
960 performed by individuals authorized to perform such operations
961 under terms of a specific radioactive materials license or
962 equivalent licensing document, issued by the Department, NRC
963 or any Agreement State. The registrant may seek to obtain a
964 specific radioactive materials license to perform these activities
965 or may use a specifically licensed service provider authorized for
966 these activities;
- 967 c. Conduct indoor air radon monitoring if materials are located in an
968 occupied indoor workspace.
- 969 (1) Monitoring shall be performed during periods of normal
970 operation and repeated if there is a significant increase
971 in the quantity of registered materials contained within
972 the workspace.
- 973 (2) Documentation of monitoring shall be maintained by the
974 registrant and shall demonstrate that average indoor
975 radon levels are not in excess of the U.S. Environmental
976 Protection Agency's 4 pCi/L radon action level.
- 977 (3) If monitoring results indicate levels in excess of the 4
978 pCi/L action level, the work area shall be restricted from
979 regular occupancy until mitigation action is taken and
980 monitoring demonstrates that average indoor radon
981 levels are below 4 pCi/L.
- 982 d. Conduct radiation dose rate surveys.
- 983 (1) Radiation dose rates shall not exceed 2 millirem/hour at
984 30 centimeters from the source of radiation or from any
985 surface that the radiation penetrates in any space that
986 can be accessed or occupied by facility personnel
- 987 (2) Registered material shall be stored only in an area
988 controlled by the registrant and shall not cause radiation
989 dose rates at or beyond the boundary of that controlled

- 990 area greater than 11 microrem/hour excluding natural
991 background.
- 992 (3) Registered material that exhibits a measured radiation
993 dose rate which exceeds 50 microrem/hour at 30
994 centimeters excluding natural background shall be:
- 995 (a) Cordoned off with a physical barrier at a
996 distance that ensures that radiation dose rates
997 at or beyond the boundary of that barrier shall
998 not exceed 50 microrem/hour excluding natural
999 background.
- 1000 (b) Labelled at the barrier with a durable, clearly
1001 visible label bearing the radiation symbol
1002 prescribed in 6 CCR 1007-1 Part 4, Section 4.27
1003 and the words "CAUTION, RADIOACTIVE
1004 MATERIAL".
- 1005 (c) Managed such that no individual handles these
1006 materials or accesses the cordoned off area for
1007 a period of time in excess of 50 hours in a year.
- 1008 (d) The registrant shall keep a record of all
1009 individuals accessing or handling these
1010 materials which shall contain at a minimum; the
1011 name of the individual; the date; the length of
1012 time in hours; and a year to date total number of
1013 hours for the individual.
- 1014 (e) This record shall be maintained by the registrant
1015 for inspection by the department.
- 1016 3. Registrants shall only transfer materials for disposal, treatment, or
1017 storage to a RCRA Subtitle C hazardous waste permitted treatment,
1018 storage and disposal facility or interim status facility which is:
- 1019 a. Within Colorado, a facility authorized to receive such material
1020 under terms of a registration as per this part or a specific
1021 radioactive materials license issued by the Department; or
- 1022 b. Outside of Colorado, a facility authorized to receive such
1023 material under terms of a specific radioactive materials license or
1024 equivalent licensing document, issued by the NRC or any
1025 Agreement State, or to any person otherwise authorized to
1026 receive or not prohibited from receiving such material by the
1027 Federal Government or any agency thereof, the Department, or
1028 an Agreement State;

1029 4. Registrants shall, prior to transfer of any materials, provide a written
1030 statement to the receiving facility as part of the description of the
1031 hazardous waste which clearly indicates the presence of naturally
1032 occurring radioactive materials as a constituent and provides
1033 characterization data regarding the radiological content of the materials
1034 to include the concentrations, in dry weight and excluding natural
1035 background, of Radium-226, Radium-228, Lead-210, and Polonium-210
1036 as applicable.

1037 20.6.2 Water Treatment Registrants

1038 A. Drinking Water. Non-Exempt TENORM generated by drinking water treatment
1039 activities shall be registered and are subject to the requirements and limitations
1040 as follows:

1041 1. Registrants may possess materials that contain or are contaminated at
1042 concentrations, excluding natural background, greater than 5 pCi/g but
1043 not in excess of 500 pCi/g each in dry weight of Radium-226, Radium-
1044 228, Lead-210, and Polonium-210.

1045 2. TENORM shall be disposed as follows:

1046 a. Disposal at commercial solid waste disposal facility registered
1047 with the Department in accordance with this Part;

1048 b. Disposal at a facility authorized to receive such material under
1049 terms of a specific radioactive materials license, a Part 20
1050 TENORM registration, or equivalent licensing document, issued
1051 by the Department, NRC or any Agreement State, or to any
1052 person otherwise authorized to receive such material by the
1053 Federal Government or any agency thereof, the Department, or
1054 an Agreement State;

1055 c. Discharge into sanitary sewerage for treatment at a domestic
1056 wastewater treatment facility registered with the Department in
1057 accordance with this Part;

1058 (1) Prior to any discharge written acknowledgement and
1059 approval shall be obtained from the POTW;

1060 (2) This record shall be maintained by the registrant for
1061 inspection by the department;

1062 d. Discharge into state waters, in accordance with the Water
1063 Quality Control Act;

1064 3. Beneficial Use. Registered drinking water treatment residuals may be
1065 beneficially used or transferred to an individual registered with the
1066 Department for beneficial use in accordance with this Part.

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4. Registrants in possession of materials that contain or are contaminated at concentrations, excluding natural background, in dry weight in excess of 50 pCi/g of any TENORM Radionuclide and contain greater than 10% solids (or are less than 90% moisture content) shall additionally:
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- a. Maintain such materials in containment such that no individual may physically interact with, directly handle, or become contaminated with those materials and to prevent dispersion outside of the containment during operations or storage;
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- b. Require that all direct handling, manipulation, and any other activities that would provide an exposure pathway different from that found in routine water treatment operations be performed by individuals authorized to perform such operations under terms of a specific radioactive materials license or equivalent licensing document, issued by the Department, NRC or any Agreement State. The registrant may seek to obtain a specific radioactive materials license to perform these activities or may use a specifically licensed service provider authorized for these activities;
- 1085
1086
- c. Conduct indoor air radon monitoring if materials are located in an occupied indoor workspace.
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- (1) Monitoring shall be performed during periods of normal operation and repeated if there is a significant increase in the quantity of registered materials contained within the workspace.
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- (2) Documentation of monitoring shall be maintained by the registrant and shall demonstrate that average indoor radon levels are not in excess of the U.S. Environmental Protection Agency's 4 pCi/L radon action level.
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- (a) If monitoring results indicate levels in excess of the 4 pCi/L action level, the work area shall be restricted from regular occupancy until mitigation action is taken and monitoring demonstrates that average indoor radon levels are below 4 pCi/L.
- 1100
- d. Conduct radiation dose rate surveys.
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- (1) Radiation dose rates shall not exceed 2 millirem/hour at 30 centimeters from the source of radiation or from any surface that the radiation penetrates in any space that can be accessed or occupied by facility personnel
- 1105
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- (2) Registered material shall be stored only in an area controlled by the registrant and shall not cause radiation

- 1107 dose rates at or beyond the boundary of that controlled
1108 area greater than 11 microrem/hour excluding natural
1109 background.
- 1110 (3) Registered material that exhibits a measured radiation
1111 dose rate which exceeds 50 microrem/hour at 30
1112 centimeters excluding natural background shall be:
- 1113 (a) Cordoned off with a physical barrier at a
1114 distance that ensures that radiation dose rates
1115 at or beyond the boundary of that barrier shall
1116 not exceed 50 microrem/hour excluding natural
1117 background.
- 1118 (b) Labelled at the barrier with a durable, clearly
1119 visible label bearing the radiation symbol
1120 prescribed in 6 CCR 1007-1 Part 4, Section 4.27
1121 and the words "CAUTION, RADIOACTIVE
1122 MATERIAL".
- 1123 (c) Managed such that no individual handles these
1124 materials or accesses the cordoned off area for
1125 a period of time in excess of 50 hours in a year.
- 1126 (d) The registrant shall keep a record of all
1127 individuals accessing or handling these
1128 materials which shall contain at a minimum; the
1129 name of the individual; the date; the length of
1130 time in hours; and a year to date total number of
1131 hours for the individual.
- 1132 (e) This record shall be maintained by the registrant
1133 for inspection by the department.
- 1134 B. Domestic Wastewater Treatment. Non-Exempt TENORM generated, accepted
1135 for treatment, or possessed by wastewater treatment facilities shall be registered
1136 and are subject to the requirements and limitations as follows:
- 1137 1. Registrants may accept at their headworks TENORM materials
1138 discharged from a water treatment facility registered with the Department
1139 in accordance with this Part that:
- 1140 a. Contain less than 10% solids; and
- 1141 b. Contain or are contaminated at concentrations, excluding natural
1142 background, greater than 5 pCi/g but not in excess of 500 pCi/g
1143 each in dry weight of Radium-226, Radium-228, Lead-210, and
1144 Polonium-210; and

- 1145 c. Constitute less than 10% of the total volume of non-TENORM
1146 materials received by the system in the period in which it is
1147 received.
- 1148 2. TENORM materials which contain or are contaminated at concentrations,
1149 excluding natural background, in dry weight greater than 50 pCi/g shall
1150 be directly handled only by individuals authorized to perform such
1151 operations under terms of a specific radioactive materials license or
1152 equivalent licensing document, issued by the Department, NRC or any
1153 Agreement State. The registrant may seek to obtain a specific
1154 radioactive materials license to perform these activities or may use a
1155 specifically licensed service provider authorized for these activities.
- 1156 3. Registrants may also possess materials in the form of residuals
1157 generated during primary, secondary or advanced wastewater treatment
1158 processes, any materials in process that are precursors to an
1159 accumulated treated residual product, biosolids, or any other materials
1160 that are part of the wastewater treatment process that contain or are
1161 contaminated at concentrations, excluding natural background, greater
1162 than 5 pCi/g but not in excess of 50 pCi/g each in dry weight of Radium-
1163 226, Radium-228, Lead-210, and Polonium-210.
- 1164 4. TENORM shall be disposed as follows:
- 1165 a. Disposal at commercial solid waste disposal facility registered
1166 with the Department in accordance with this Part;
- 1167 b. Disposal at a facility authorized to receive such material under
1168 terms of a specific radioactive materials license, a Part 20
1169 TENORM registration, or equivalent licensing document, issued
1170 by the Department, NRC or any Agreement State, or to any
1171 person otherwise authorized to receive such material by the
1172 Federal Government or any agency thereof, the Department, or
1173 an Agreement State;
- 1174 c. Discharge into state waters, in accordance with the Water
1175 Quality Control Act;
- 1176 5. Biosolids containing TENORM may be beneficially used or transferred to
1177 an individual registered with the Department for beneficial use in
1178 accordance with this Part.
- 1179 C. Other water treatment. Non-Exempt TENORM generated by any other water
1180 treatment activity shall be registered and are subject to the requirements and
1181 limitations as follows:
- 1182 1. Registrants may possess materials that contain or are contaminated at
1183 concentrations, excluding natural background, greater than 5 pCi/g but

Commented [GJ34]: Other water treatment may include industrial operations that treat water to remove impurities for certain processes or those that seek to remove contaminants to meet regulatory standards such as mine water treatment prior to discharge.

1184 not in excess of 50 pCi/g each in dry weight of Radium-226, Radium-
1185 228, Lead-210, and Polonium-210.

1186 2. TENORM shall be disposed as follows:

1187 a. Disposal at commercial solid waste disposal facility registered
1188 with the Department in accordance with this Part;

1189 b. Disposal at a facility authorized to receive such material under
1190 terms of a specific radioactive materials license, a Part 20
1191 TENORM registration, or equivalent licensing document, issued
1192 by the Department, NRC or any Agreement State, or to any
1193 person otherwise authorized to receive such material by the
1194 Federal Government or any agency thereof, the Department, or
1195 an Agreement State;

1196 c. Discharge into sanitary sewerage for treatment at a domestic
1197 wastewater treatment facility registered with the Department in
1198 accordance with this Part;

1199 (1) Prior to any discharge written acknowledgement and
1200 approval shall be obtained from the POTW;

1201 (2) This record shall be maintained by the registrant for
1202 inspection by the department;

1203 d. Discharge into state waters, in accordance with the Water
1204 Quality Control Act;

1205 **20.7 Registration as a user of TENORM for Beneficial Purposes**

1206 20.7.1 Use and Distribution of Biosolids. Non-Exempt TENORM in the form of biosolids for use
1207 and distribution shall be registered and are subject to the requirements and limitations as
1208 follows:

1209 A. Registrants may possess materials that contain or are contaminated at
1210 concentrations, excluding natural background, greater than 5 pCi/g but not in
1211 excess of 50 pCi/g each in dry weight of Radium-226, Radium-228, Lead-210,
1212 and Polonium-210.

1213 B. Activities shall be in accord with a Notice of Authorization for the Use and
1214 Distribution of Biosolids issued by the Water Quality and Control Division of the
1215 Department and 5 CCR 1002-64.

1216 C. Application to land for beneficial use.

1217 1. Concentrations of radionuclides in biosolids or final product material
1218 applied to land shall not exceed 25 pCi/g each of Radium-226, Radium-
1219 228, Lead-210, and Polonium-210.

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2. Biosolids or final product material containing Non-Exempt TENORM shall not be applied to an authorized application site for more than 20 years or 20 cropping cycles without written department approval.
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- D. Characterization. Characterization of TENORM materials including sampling and analysis shall be performed using appropriate and standard methods such as EPA SW-846 or equivalent alternative methods recognized by the department.
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1. Biosolids or final product material shall be characterized for concentrations of TENORM radionuclides after final treatment.
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2. Characterization shall be done initially after final treatment and thereafter at the following frequencies based on dry short tons per year (dst/y) produced consistent with 5 CCR 1002-64 Section 64.16 a.(1):
- 1231
- a. Once per year for less than 319 dst/y.
- 1232
- b. Once per quarter for greater than 319 but less than 1,650 dst/y.
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1234
- c. Once per two months for greater than 1,650 but less than 16,500 dst/y.
- 1235
- d. Once per month for greater than 16,500 dst/y.
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3. Records of characterization shall be maintained for inspection by the Department until such time as the authorized application site is closed or deactivated in accordance with 5 CCR 1002-64 Sections 64.10 H. and I.
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4. Registrants shall provide notice to the department sixty days prior to requesting closure, deactivation, or a transfer of an authorized application site in accordance with 5 CCR 1002-64 Sections 64.10 H., I. and J.
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- E. Records of land application shall be provided to the department annually. Records shall include:
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1. Each application site location; and
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2. Number of applications at each site.
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- F. Distribution. Biosolids or final product material containing Non-Exempt TENORM shall be distributed only to a recipient registered with the department in accord with this part or to an individual authorized to receive such material under terms of a specific radioactive materials license or equivalent licensing document, issued by the Department, NRC or any Agreement State, or to any person otherwise authorized to receive such material by the Federal Government or any agency thereof, the Department, or an Agreement State.

- 1254 20.7.2 Land application of water treatment residuals. Non-Exempt TENORM in the form of water
1255 treatment residuals to be used for land application shall be registered and are subject to
1256 the requirements and limitations as follows:
- 1257 A. Registrants may possess materials that contain or are contaminated at
1258 concentrations, excluding natural background, greater than 5 pCi/g but not in
1259 excess of 50 pCi/g each in dry weight of Radium-226, Radium-228, Lead-210,
1260 and Polonium-210.
- 1261 B. Activities shall be in accord with a Beneficial Use Certification or Beneficial Use
1262 Determination issued by the Hazardous Materials and Waste Management
1263 Division of the Department.
- 1264 C. Application to land for beneficial use.
- 1265 1. Concentrations of radionuclides in water treatment residuals applied to
1266 land shall not exceed 25 pCi/g each of Radium-226, Radium-228, Lead-
1267 210, and Polonium-210.
- 1268 2. Water treatment residuals containing Non-Exempt TENORM shall not be
1269 applied to an authorized application site for more than 20 years or 20
1270 cropping cycles without written department approval.
- 1271 D. Characterization. Characterization of TENORM materials including sampling and
1272 analysis shall be performed using appropriate and standard methods such as
1273 EPA SW-846 or equivalent alternative methods recognized by the department.
- 1274 1. Water treatment residuals shall be characterized for concentrations of
1275 TENORM radionuclides prior to application.
- 1276 2. Characterization shall be done initially on residuals to be applied to land
1277 and thereafter at the following frequencies based on dry short tons per
1278 year (dst/y) produced:
- 1279 a. Once per year for less than 319 dst/y.
- 1280 b. Once per quarter for greater than 319 but less than 1,650 dst/y.
- 1281 c. Once per two months for greater than 1,650 but less than 16,500
1282 dst/y.
- 1283 d. Once per month for greater than 16,500 dst/y.
- 1284 3. Records of characterization shall be maintained for inspection by the
1285 Department until such time as the application activities cease at the site.
- 1286 4. Registrants shall provide notice to the department sixty days prior to
1287 ceasing application activities at the site.

- 1288 E. Records of land application shall be provided to the department annually.
1289 Records shall include:
- 1290 1. Each application site location; and
1291 2. Number of applications at each site.
- 1292 20.7.3 Composting Facility Registrant. Facilities that compost Non-Exempt TENORM shall be
1293 registered and are subject to the requirements and limitations as follows:
- 1294 A. Registrants may accept and/or process feedstock materials that contain or are
1295 contaminated at concentrations, excluding natural background, greater than 5
1296 pCi/g but not in excess of 50 pCi/g each in dry weight of Radium-226, Radium-
1297 228, Lead-210, and Polonium-210.
- 1298 B. Commercial composting facility activities shall be in accord with 6 CCR 1007-2
1299 Part 1 Section 14.
- 1300 1. Registrants shall initially include or revise their Engineering Design and
1301 Operations Plan to include TENORM constituents in:
- 1302 a. The description of feedstocks;
1303 b. The waste characterization plan;
1304 c. The evaluation of potential impacts to existing surface water and
1305 groundwater quality;
1306 d. The groundwater monitoring plan; and
1307 e. The compost sampling and testing description.
- 1308 C. Composting activities performed as part of further processing of biosolids at a
1309 domestic wastewater treatment works as shall be in accord with 5 CCR 1002-64
1310 and a Notice of Authorization for the Use and Distribution of Biosolids issued by
1311 the Water Quality and Control Division of the Department.
- 1312 D. Sale or Distribution.
- 1313 1. Finished compost shall be characterized for concentrations of TENORM
1314 radionuclides prior to sale or distribution.
- 1315 2. Characterization, including sampling and analysis, shall be performed
1316 using appropriate and standard methods such as EPA SW-846 or
1317 equivalent alternative methods recognized by the department.
- 1318 3. Characterization shall be done initially on finished compost and
1319 thereafter at the following frequencies based on dry short tons per year
1320 (dst/y) produced:

- 1321 a. Once per year for less than 319 dst/y.
- 1322 b. Once per quarter for greater than 319 but less than 1,650 dst/y.
- 1323 c. Once per two months for greater than 1,650 but less than 16,500
1324 dst/y.
- 1325 d. Once per month for greater than 16,500 dst/y.
- 1326 e. If feedstocks change the initial characterization shall be
1327 repeated.
- 1328 4. Registrants must ensure that concentrations of TENORM radionuclides
1329 in finished compost to be sold or distributed for off-site use shall not
1330 exceed 5 pCi/g each of Radium-226, Radium-228, Lead-210, and
1331 Polonium-210.
- 1332 5. Records of characterization data demonstrating compliance with the 5
1333 pCi/g standard shall be maintained for inspection by the Department for
1334 no less than 5 years after the materials have been distributed.
- 1335 6. Compost that meets the 5 pCi/g standard is acceptable for unrestricted
1336 use and is no longer subject to this Part.
- 1337 E. Finished Compost containing Non-Exempt TENORM shall be:
- 1338 1. Transferred only to a recipient registered with the department in accord
1339 with this Part for use or disposal;
- 1340 2. Reintroduced into the compost process; or
- 1341 3. Transferred to an individual authorized to receive such material under
1342 terms of a specific radioactive materials license or equivalent licensing
1343 document, issued by the Department, NRC or any Agreement State, or
1344 to any person otherwise authorized to receive such material by the
1345 Federal Government or any agency thereof, the Department, or an
1346 Agreement State.
- 1347 F. Final closure. The compost facility shall not be closed and released for
1348 unrestricted use until:
- 1349 1. All registered TENORM materials are disposed or transferred in
1350 accordance with Sections 20.7.3.E.1 or 20.7.3.E.3; and
- 1351 2. Radiological characterization of the facility shall be conducted to ensure
1352 that:
- 1353 a. Any radionuclide concentration in soil, adjacent to or within the
1354 facility boundary, does not exceed the limitation specified in

- 1355 Table 20-1 of this Part. If any exceedance is found, the facility
1356 shall be remediated until the limits in Table 20-1 are met.
- 1357 b. Radionuclide concentrations in groundwater do not exceed 5
1358 pCi/L for Radium-226 plus Radium-228 and 5 pCi/L for Lead-210
1359 plus Polonium-210; or the statewide standards for radioactive
1360 materials established by the Water Quality Control Commission
1361 in accordance with the Water Quality Control Act, whichever is
1362 more restrictive. If any exceedance is found, the facility shall
1363 conduct groundwater remediation until the above limits are met.
- 1364 20.7.4 Other Beneficial Uses. Persons requesting the beneficial use of solid waste that contain
1365 or are contaminated at concentrations, excluding natural background, greater than 5
1366 pCi/g in dry weight of Radium-226, Radium-228, Lead-210, or Polonium-210 shall:
- 1367 A. File a proposal with the Hazardous Materials and Waste Management Division of
1368 the department in accord with 6 CCR 1007-2 Part 1 Section 8.6.
- 1369 B. Provide to the department a comprehensive dose assessment demonstrating
1370 that the beneficial use activity would not result in a total effective dose equivalent
1371 to any individual member of the public in excess of 100 millirem/year and that the
1372 doses to members of the public as a result of the proposed activities are as low
1373 as is reasonably achievable (ALARA).
- 1374 C. Commence activities only after:
- 1375 1. A Beneficial Use Certification or Beneficial Use Determination is issued
1376 by the Hazardous Materials and Waste Management Division of the
1377 Department; and
- 1378 2. The Radiation Control Program grants written authorization to engage in
1379 the activities as approved within the Beneficial Use Certification or
1380 Beneficial Use Determination.
- 1381 D. Limit beneficial use activities to those specifically approved and authorized within
1382 and by the A Beneficial Use Certification or Beneficial Use Determination and
1383 written authorization by the Radiation Control Program.
- 1384 **20.8 Registration as a TENORM Disposal Facility**
- 1385 20.8.1 Sanitary landfill or municipal solid waste landfill (MSWLF) disposal. Landfills that accept
1386 Non-Exempt TENORM for disposal shall be registered and are subject to the
1387 requirements and limitations as follows:
- 1388 A. Registrants may accept materials that contain or are contaminated at
1389 concentrations, excluding natural background, greater than 5 pCi/g but not in
1390 excess of 50 pCi/g each in dry weight of Radium-226, Radium-228, Lead-210,
1391 and Polonium-210.

- 1392 B. Registrants shall meet all associated and applicable requirements of 6 CCR
1393 1007-2 Part 1 for solid waste disposal.
- 1394 C. Registered facilities shall have an engineered liner or barrier layer with a
1395 hydraulic conductivity less than or equal to 1×10^{-7} cm/sec in accord with 6 CCR
1396 1007-2 Part 1 Section 3.2.5 (3)
- 1397 D. Registered facilities shall have a leachate collection and monitoring system which
1398 meets 6 CCR 1007-2 Part 1 Section 3.2.5 (d)
- 1399 E. Registered facilities shall have a groundwater monitoring system which meets
1400 the applicable requirements of 6 CCR 1007-2 Part 1 Section 2.1.15 and 2.2
- 1401 F. Registered facilities shall incorporate the following operational practices into their
1402 Engineering Design and Operations Plan:
- 1403 1. Each registered facility shall have a waste characterization and disposal
1404 plan which includes waste acceptance procedures for TENORM
1405 materials
- 1406 2. Each registered facility shall have a minimum of 4 meters of materials
1407 not subject to this part, in addition to the engineered liner or barrier layer,
1408 between the lowest placement of Non-Exempt TENORM and
1409 groundwater
- 1410 3. Each registered facility shall place 6 inches of cover materials not subject
1411 to this part on all TENORM at the end of each operating day
- 1412 4. Each registered facility shall have a minimum of 3 meters of materials
1413 not subject to this part above Non-Exempt TENORM prior to the closure
1414 of any area. This may include the final cover system
- 1415 5. Leachate must be sampled and characterized for each TENORM isotope
1416 received by the facility
- 1417 a. If concentrations of TENORM isotopes are detected in the
1418 leachate in excess of the groundwater standards these isotopes
1419 must be included in the groundwater monitoring plan
- 1420 b. Leachate containing concentrations of TENORM isotopes less
1421 than 100 pCi/L may be applied to the working face of the landfill.
- 1422 c. Registrants shall not perform any other method of recirculation or
1423 application of leachate containing concentrations of TENORM
1424 isotopes in excess of groundwater standards within the facility
1425 without prior written approval from the department.

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6. Any drill cuttings from methane gas collection system installation shall be placed within the facility on the working face and treated as TENORM waste.
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7. If solidification activities are approved within the EDOP for the facility Non-exempt TENORM materials received by the facility for solidification shall be placed within the solidification basins and the solidification process should commence within 24 hours of receipt.
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- G. Following closure of the landfill, an environmental covenant must be placed on the facility property and shall include a specific provision which requires that any future buildings, residential or commercial, constructed on the permitted site post closure, require radon resistant construction, post construction assessment and testing, and radon mitigation in order to meet any federal, local, or Colorado standards or guidance on indoor radon concentrations.
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1. Alternatively, if the environmental covenant is more restrictive, i.e. no buildings, residential or commercial, are permitted to be constructed on the site, than that may suffice.
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- 20.8.2 Centralized E&P waste management facilities that accept Non-Exempt TENORM for disposal shall be registered and are subject to the requirements and limitations as follows:
- 1445
- A. Registrants shall comply with all applicable sections of 2 CCR 404-1.
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1. Radium-226, Radium-228, Lead-210, and Polonium-210 shall, when operations involve Non-Exempt TENORM, be included as a Contaminant of Concern in all instances in which Table 910-1 Concentration Levels are required to be sampled, analyzed, or adhered to for the purposes of determining the nature and extent of any impact from the materials, groundwater, surface water or soil monitoring, remediation, confirming compliance, or closure.
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- a. A concentration, excluding natural background, not in excess of 5 pCi/g of each applicable radionuclide in dry weight shall be used as the concentration level for the purposes of determining compliance with this section for soils. Concentration level values for groundwater and surface water shall be equal to 5 pCi/L for Radium-226 plus Radium-228; 5 pCi/L for Lead-210 plus Polonium-210; or equal to statewide standards for radioactive materials established by the Water Quality Control Commission in accordance with the Water Quality Control Act, whichever is more restrictive.
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- B. Registrants shall notify the Department of any exceedance of these radionuclide concentration levels and submit a plan for the investigation and remediation of the areas.

- 1466 C. Registrants shall, as part of the initial permit application process or as a facility
1467 modification proposal as required by 2 CCR 404-1 Rule 908, incorporate and
1468 include TENORM as a waste stream into all appropriate or applicable portions of
1469 the application or proposal including but not limited to waste profile, facility
1470 design, operating plan, ground water monitoring plan, or preliminary closure plan.
1471 The application or proposal for permit modification shall also be submitted to the
1472 department for approval prior to accepting any TENORM materials for treatment
1473 or disposal.
- 1474 D. Registrants shall provide to the department a copy of the facility's annual report
1475 as required by 2 CCR 404-1 Rule 908. TENORM materials shall be included
1476 within the report's summary of operations.
- 1477 E. Registrants may accept produced fluids that contain or are contaminated at
1478 concentrations, excluding natural background, greater than 5 pCi/g but not in
1479 excess of 250 pCi/g each in dry weight of Radium-226, Radium-228, Lead-210,
1480 and Polonium-210 for injection into a Class II well permitted in accordance with 2
1481 CCR 404-1, Rule 325.
- 1482 1. Shall provide demonstration, at the time of initial registration, that those
1483 activities will not result in the presence in an underground source of
1484 drinking water, as defined in 2 CCR 404-1 Rule 324a, of any TENORM
1485 radionuclide which may cause a violation of any primary drinking water
1486 regulation in effect as of July 12, 1982 and found at 40 C.F.R. Part 141,
1487 or may otherwise adversely affect the health of persons.
- 1488 F. Registrants may accept, for the purposes of dewatering or hydrocarbon recovery,
1489 materials that contain or are contaminated at concentrations, excluding natural
1490 background, greater than 5 pCi/g but not in excess of 50 pCi/g each in dry weight
1491 of Radium-226, Radium-228, Lead-210, and Polonium-210.
- 1492 G. Any Non-Exempt TENORM materials generated during treatment or disposal
1493 activities shall be subject to all applicable requirements of Section 20.6.1.
- 1494 H. Closure: A detailed site investigation, remediation, and closure work plan shall be
1495 submitted to the department for review and approval at least sixty (60) days prior
1496 to closure. The work plan shall address, but not be limited to:
- 1497 1. Sampling and analysis to determine the extent of contamination in or
1498 compliance with standards for soil, surface water, and groundwater
- 1499 2. Activities required to decommission and remove all equipment
1500 contaminated with TENORM materials
- 1501 3. Disposal of residual TENORM
- 1502 4. Facility access control

- 1503 5. Potential exposures to TENORM during remedial activities including
- 1504 either a radiological dose estimate demonstrating that no individual will
- 1505 exceed an annual dose of 100 millirem or information on the individuals
- 1506 authorized to perform such operations under terms of a specific
- 1507 radioactive materials license or equivalent licensing document, issued by
- 1508 the Department, NRC or any Agreement State.

- 1509 6. Schedule for remedial and closure activities to be conducted and
- 1510 completed

- 1511 7. Post-closure monitoring

1512 **20.9 Registration of other TENORM and TENORM Related Activities**

1513 20.9.1 Any Non-Exempt TENORM material generated, used beneficially, or accepted for

1514 disposal which is not captured by Sections 20.6, 20.7, or 20.8 of this part may be

1515 registered with the department when the department makes a determination, upon

1516 request or application for such determination, that the reasonably maximally exposed

1517 individual will not receive a dose with a total effective dose equivalent (TEDE) of more

1518 than 100 millirem (0.1 rem) in one year from all licensed or registered sources of radiation

1519 including TENORM. This registration would be in lieu of a specific radioactive materials

1520 license as per Section 20.13

1521 A. The registrant will be subject to the general registration provisions of this part and

1522 to any additional requirements and conditions with respect to the registrant's

1523 receipt, possession, use, disposal, and transfer of TENORM subject to this part,

1524 as it deems appropriate or necessary in order to:

- 1525 1. Minimize danger to public health and safety, workers, or property; and
- 1526 2. Prevent loss or theft of material subject to this part.

1527 20.9.2 The Department may grant an approval to persons registered per Sections 20.6, 20.7, or

1528 20.8 to conduct activities not specifically identified within Sections 20.6, 20.7, or 20.8,

1529 such as alternative disposal or handling practices, when the Department makes a

1530 determination, upon request or application for such determination, that as a result of the

1531 activities the reasonably maximally exposed individual will not receive a dose with a total

1532 effective dose effective dose equivalent (TEDE) of more than 100 millirem (0.1 rem) in

1533 one year from all licensed or registered sources of radiation including TENORM.

1534 A. Approval for these alternate activities shall be approved in writing and records of

1535 the approval must be maintained until the registration is terminated pursuant to

1536 Section 20.12 of this Part.

1537 **20.10 Records**

1538 20.10.1 Each registrant shall retain all records that are required by the regulations in this Part or

1539 by registration condition for the period specified by the appropriate regulation or

1540 registration condition. If a retention period is not otherwise specified by regulation or

Commented [GJ35]: This section was added to better account for those persons, activities, or materials that do not fit into one of the predesignated TENORM registrant categories and allow for registration rather than a specific radioactive materials license.

- 1541 registration condition, each record must be maintained until the registration is terminated
1542 pursuant to Section 20.12 of this Part.
- 1543 20.10.2 Each registrant shall make records available to the Department for inspection during
1544 normal business hours, and copies thereof shall be furnished to the Department upon
1545 request.
- 1546 20.10.3 Each registrant shall retain records of receipt, transfer, and disposal of TENORM as long
1547 as the material is possessed and for three years following transfer or disposition,
1548 including at a minimum:
- 1549 A. The date of the transport;
- 1550 B. The identity of the TENORM generator or registrant;
- 1551 C. The identity of the TENORM transporter;
- 1552 D. The location of the TENORM pickup site;
- 1553 E. The type and volume of wastes, including radiological characterization data; and
- 1554 F. The name and location of the recipient or disposal site.
- 1555 20.10.4 Each registrant must create and retain a record of current training of each employee,
1556 inclusive of the preceding three years, in accordance with Section 20.5.3 for as long as
1557 that employee is employed by that registrant and for 90 days thereafter. A registrant must
1558 make an employee's record of current training available upon request by the Department.
1559 The record must include:
- 1560 A. The employee's name;
- 1561 B. The most recent training completion date of the employee's training;
- 1562 C. A description, copy, or the location of the training materials used to meet the
1563 requirements in this section; and
- 1564 D. Certification that the employee has been trained as required by this Part.
- 1565 20.10.5 Each registrant shall retain the radiological characterization information or other
1566 information that demonstrates compliance with the applicable requirements of this Part,
1567 including but not limited to, the analytical data and laboratory reports, volumes of the
1568 materials, waste or material profiles, surveys, and indoor radon monitoring.
- 1569 **20.11 Transfers. The Department may, upon application or upon its own initiative,
1570 approve transfers of Non-Exempt TENORM not specifically authorized within this
1571 part as it determines is authorized by law and will not result in undue hazard to
1572 public health and safety or property.**
- 1573 **20.12 Registration Termination**

1574 20.12.1 Each registrant shall provide a written notification to the Department when the registration
1575 is ready for termination. The notification shall include documentation demonstrating that
1576 Sections 20.12.2.A through E have been met.

1577 20.12.2 Registrations will be terminated by written notice to the registrant when the department
1578 determines the following:

- 1579 A. TENORM has been properly transferred, dispositioned, or disposed of in accord
1580 with this part;
- 1581 B. Reasonable effort has been made to eliminate residual radioactive
1582 contamination, if present;
- 1583 C. The registrant has demonstrated, by radiation survey results and/or other
1584 appropriate methods, that the registration termination will be in compliance with
1585 Section 20.5.2.I;
- 1586 D. Department approved institutional controls have been implemented to limit public
1587 doses, if required; and
- 1588 E. For disposal facilities, all closure requirements have been implemented.

1589 **20.13 Specific Licensing.**

1590 20.13.1 Unlicensed persons who generate, handle, process, transfer, receive, transport, dispose
1591 of, possess, distribute, or beneficially use TENORM not exempt from this Part as per
1592 Section 20.4 and not meeting the requirements of both TENORM concentration limitation
1593 or permitted activity specified in Sections 20.6, 20.7, and 20.8 shall, within 90 days of
1594 making a TENORM determination:

- 1595 A. Submit an application for a specific radioactive materials license to the
1596 department in accordance with 6 CCR 1007-1 Part 03, Section 3.8 or
- 1597 B. Submit a written request to the department for an exemption or exception from
1598 specific licensing requirements. The request shall contain:
 - 1599 1. A comprehensive description of TENORM materials;
 - 1600 2. A comprehensive description of all operations involving TENORM
1601 materials;
 - 1602 3. A detailed dose assessment demonstrating that the reasonably
1603 maximally exposed individual will not receive a dose with a total effective
1604 dose equivalent (TEDE) of more than 100 millirem (0.1 rem) in one year
1605 from all licensed or registered sources of radiation including TENORM.

1606 20.13.2 The Department may grant an exemption or exception to any person from specific
1607 licensing requirements but require registration of the TENORM materials when the
1608 Department makes a determination, upon request or application for such determination,

1609 that the reasonably maximally exposed individual will not receive a dose with a total
1610 effective dose equivalent (TEDE) of more than 100 millirem (0.1 rem) in one year from all
1611 licensed or registered sources of radiation including TENORM.

1612 20.13.3 Persons authorized by a specific radioactive materials license for TENORM materials are
1613 not subject to registration requirements in Sections 20.5 through 20.12.

1614 20.13.4 The Department may, by written notice, require any person subject to registration to
1615 apply for and obtain a specific license if the department determines that specific licensure
1616 is necessary to minimize danger to public health and safety or property. The notice shall
1617 state the reason or reasons for requiring a specific license.

1618 20.13.5 A specific license is required to decontaminate equipment, facilities, or land not exempted
1619 under the provisions of Section 20.3. For purposes of this subsection, the term
1620 "decontaminate" shall not include routine maintenance which may result in the incidental
1621 removal of contamination.

1622 20.13.6 A specific license is required to provide services to TENORM registrants for direct
1623 handling, manipulation, or any other activities that would provide an exposure pathway
1624 different from that found in routine handling operations authorized in Sections 20.6, 20.7,
1625 and 20.8.