

ATTACHMENT 1

DRAFT

NOTICE OF PROPOSED RULEMAKING

CHAPTER 345

DEPARTMENT OF ENERGY, ENERGY FACILITY SITING COUNCIL

FILING CAPTION: Updating rules to conform to revised statute and to allow for practicable implementation.

LAST DAY AND TIME TO OFFER COMMENT TO AGENCY: 11/14/2023 5:00 PM

PUBLIC HEARING DATE: TBD

NEED FOR THE RULE(S):

With Senate Bill 246 (2021), the legislature enabled the Energy Facility Siting Council, with support from ODOE, to update and clarify the definition of radioactive waste subject to the disposal ban (OAR 345 Division 50).

The rulemaking was undertaken to evaluate whether changes to rules are needed to protect public health and safety; consider what, if any, standards and rules are necessary to prevent disposal of radioactive waste in Oregon; and to align requirements with regulatory authority of other agencies and with practicable actions. The rulemaking will also improve how the process rules are organized and external Tables are referenced. Two new exemptions were added to the ruleset: one for petroleum wastes enriched in Lead-210 and one for metabolized medical isotopes when the receiving facility has a work procedure approved by ODOE staff.

DOCUMENTS RELIED UPON, AND WHERE THEY ARE AVAILABLE:

Staff Report and Supporting Materials for Energy Facility Siting Council meetings found at:
<https://www.oregon.gov/energy/facilities-safety/facilities/Pages/Council-Meetings.aspx>

STATEMENT IDENTIFYING HOW ADOPTION OF RULE(S) WILL AFFECT RACIAL EQUITY IN THIS STATE:

It is not clear that this rulemaking would have a direct impact on racial equity in this state.

FISCAL AND ECONOMIC IMPACT:

These rule changes are intended to establish clear compliance guidelines, reduce worker risk, and increase equipment utilization.

COST OF COMPLIANCE:

(1) Identify any state agencies, units of local government, and members of the public likely to be economically affected by the rule(s). (2) Effect on Small Businesses: (a) Estimate the number and type of small businesses subject to the rule(s); (b) Describe the expected reporting, recordkeeping and administrative activities and cost required to comply with the rule(s); (c) Estimate the cost of professional services, equipment supplies, labor and increased administration required to comply with the rule(s).

(1) The ruleset will have minor impact to OHA-RPS and ODOE.

(2) (a) The ruleset is not anticipated to have any significant impact to small business.

(b) The ruleset establishes an opportunity for non-licensed disposal facilities to develop a waste management plan for metabolized medical isotopes. Following development of the plan, facilities would be expected to produce an annual summary memo. All reporting for licensed facilities is consistent with the requirements of their license.

(c) The one-time plan development for non-licensed facilities may incur consulting fees, anticipated to be less than \$100,000.

DESCRIBE HOW SMALL BUSINESSES WERE INVOLVED IN THE DEVELOPMENT OF THESE RULE(S):

Small businesses were included in in the rulemaking process through OBI and ORRA.

WAS AN ADMINISTRATIVE RULE ADVISORY COMMITTEE CONSULTED? YES

CONTACT:

Thomas Jackman
503-551-7603
tom.jackman@energy.oregon.gov
550 Capitol St. NE
Salem,OR 97301

RULES PROPOSED:

345-050-0006, 345-050-0010, 345-050-0020, 345-050-0025, 345-050-0030

AMEND: 345-050-0006

RULE TITLE: Disposal Prohibited

RULE SUMMARY: Modified rule language to be consistent with ORS 469.525 revision.

RULE TEXT:

As provided under ORS 469.525, no radioactive waste shall be disposed of within this state, no person may arrange for disposal of radioactive waste within this state, no person may transport radioactive waste for disposal in this state and no waste disposal facility for any radioactive waste shall be established, operated or licensed within this state, except as provided in ORS chapter 469 and this division.

STATUTORY/OTHER AUTHORITY: ORS 469.470

STATUTES/OTHER IMPLEMENTED: ORS 469.525

AMEND: 345-050-0010

RULE TITLE: Purpose and Applicability

RULE SUMMARY: Modifying rule language to allow for practicable implementation of rule requirements.

RULE TEXT:

(1) Because virtually all materials contain some radioactivity, the purpose of the rules in OAR 345-050-0006 through 345-050-0039 is to identify those materials that present such small health hazards that they are not considered to be radioactive waste and may be disposed of within the state.

(2) OAR 345-050-0040 through 345-050-0130 establish standards for the siting of facilities for disposal of radioactive wastes that were generated before June 1, 1981, through industrial or manufacturing processes and that contain naturally occurring radioactive isotopes. These rules implement the requirements of ORS 469.375, 469.470 and 469.501 to 469.559 for such waste disposal facilities.

(3) Except as provided in OAR 345-050-0060, these rules do not apply to uranium mine overburden or uranium mill tailings, mill wastes or mill by-product material that are subject to OAR chapter 345, divisions 92 and 95.

(4) In accordance with ORS 469.525, the Department may establish an enforceable timeline or other requirements to determine whether a material is radioactive waste.

(5) For the purpose of these rules, disposal does not include:

(a) Temporary storage and staging of radioactive waste used or generated and stored or staged in accordance with a state license under ORS 453.635 as part of regular site operations

(b) Temporary storage of radioactive waste at the Trojan Spent Fuel Storage Installation until a federal waste repository is operational, subject to the provisions of OAR 345-026-0300 through 345-026-0390

(c) Temporary storage of radioactive waste from a reactor for which a site certificate has been issued pursuant to this chapter that is operated by a college, university or graduate center for research purposes and is not connected to the Northwest Power Grid; and

(d) Temporary storage of radioactive waste at a facility not licensed under ORS 453.635 pending lawful disposal out of this state, subject to the following:

(i) Any person that intends to temporarily store radioactive waste must report to the Department and Oregon Health Authority within 10 business days of discovery of such waste. The Department, in consultation with Oregon Health Authority, must determine that temporary storage of radioactive waste presents no significant risk to health and safety of the public and workforce. In order to determine that a radioactive waste presents no significant risk during temporary storage, it must be demonstrated that:

(A) the waste will be located in an area of a facility that is reasonably expected to be inaccessible to

the public,

(B) the waste will be clearly marked and cordoned or otherwise isolated from workers, and must be stored in such a manner that minimizes risk of mobilization. This may include cover and/or secondary containment;

(C) workers will be informed and instructed on safety related to the waste;

(D) any other requirements as determined by the Department in consultation with Oregon Health Authority and the holder of the waste.

(ii) Temporary storage may not exceed 90 days without prior written authorization from the Department. To grant authorization to temporarily store radioactive waste for more than 90 days, the Department, in collaboration with Oregon Health Authority, must be assured that the waste will be properly disposed as soon as reasonably achievable, not to exceed 180 days in total.

STATUTORY/OTHER AUTHORITY: ORS 469.470

STATUTES/OTHER IMPLEMENTED: ORS 469.525

AMEND: 345-050-0020

RULE TITLE: Exempt Concentrations

RULE SUMMARY: Modified and moved rule language for internal consistency and added an exemption.

RULE TEXT:

(1) Materials that contain radionuclides in concentrations below the applicable concentration identified in Table 1 are not radioactive waste for purposes of ORS 469.525 and these rules. Additionally, wastes with the following characteristics are considered to contain exempt concentrations:

(2) Radium-bearing materials containing less than 5 picocuries of radium-226 per gram of solid, regardless of quantity,

(3) Thorium-bearing materials containing less than 20 picocuries of radium-228 per gram of solid, if the radium-228 is present with the parent thorium-232, regardless of quantity, or

(4) Lead-210-bearing wastes which are not in equilibrium with uranium-238, are the result of fossil fuel-related production including refining, transport, or storage, and contain less than 10 picocuries per gram of solid regardless of quantity.

[ED. NOTE: The Table referenced in this rule is not printed in the OAR Compilation. Copies are available from the agency.]

STATUTORY/OTHER AUTHORITY: ORS 469

STATUTES/OTHER IMPLEMENTED: ORS 469.300, ORS 469.470, ORS 469.525

AMEND: 345-050-0025

RULE TITLE: Exempt Quantities

RULE SUMMARY: Modified and moved rule language for internal consistency.

RULE TEXT:

(1) Materials that contain radionuclides in individual quantities that do not exceed the applicable quantity identified in Table 2 are not radioactive waste for the purposes of ORS 469.525 and these rules unless the number of individual radionuclides at their maximum allowable activity given in Table 2 exceeds 10. Additionally, wastes with the following characteristics are considered to contain exempt quantities:

(2) Radium-bearing material containing a total radium-226 activity of less than 10 microcuries, regardless of concentration.

(3) Thorium-bearing materials containing a total radium-228 activity of less than 100 microcuries, if the radium-228 is present with the parent thorium-232, regardless of concentration in the solid.

[ED. NOTE: The Table referenced in this rule is not printed in the OAR Compilation. Copies are available from the agency.]

STATUTORY/OTHER AUTHORITY: ORS 469.470

STATUTES/OTHER IMPLEMENTED: ORS 469.300, ORS 97.153

AMEND: 345-050-0030

RULE TITLE: Specific Exemptions

RULE SUMMARY: Modified and moved rule language for internal consistency and added an exemption.

RULE TEXT:

In addition to the exemptions under OAR 345-050-0020 and 345-050-0025, the following materials are exempt from the provisions of ORS 469.525 and OAR 345-050-0006:

(1) Radioactive material that has been incorporated into a consumer product manufactured under a license issued by the Nuclear Regulatory Commission (NRC) or by an Agreement State, if the NRC or the Agreement State that issued the license has determined that the possession, use, transfer and disposal of such consumer product are exempt from regulatory requirements. An "Agreement State" is a state to which the NRC has delegated its authority to license and regulate byproduct materials (radioisotopes), source materials (uranium and thorium) and certain quantities of special nuclear materials in accordance with section 274b of the Atomic Energy Act.

(2) Medical, industrial and research laboratory wastes contained in small, sealed, discrete containers in which the radioactive material is dissolved or dispersed in an organic solvent or biological fluid for the purpose of liquid scintillation counting and experimental animal carcasses that are disposed of or treated at a hazardous waste disposal facility licensed by the U.S. Environmental Protection Agency (U.S. EPA), by the Oregon Department of Environmental Quality, or by another state delegated the responsibility to regulate the disposal or treatment of hazardous waste by the U.S. EPA.

(3) Burial of a human or animal body containing radioactive materials used for diagnostic or therapeutic purposes is exempt from the provisions of ORS 469.525 if the burial is otherwise done in accordance with applicable Oregon law.

(4) Waste that is identified as the result of metabolized isotopes used in medical treatment. A facility may only dispose of such waste in accordance with a facility-specific plan approved by the Department in consultation with Oregon Health Authority. The plan must ensure that the material presents no significant risk to the public, workers, or the environment. The plan, at a minimum, should include:

(a) how the facility will identify and confirm that waste is the result of metabolized isotopes used in medical treatment;

(b) information regarding worker safety and training;

(c) how the facility will manage waste that is determined to not be the result of metabolized isotopes used in medical treatment; and

(d) a tracking and reporting schedule for informing the Department and Oregon Health Authority of actions taken under the plan.

(5) Wastes containing only naturally occurring radioactive isotopes other than those in the uranium

and thorium decay series, as long as the isotopes exist in their naturally occurring isotopic concentrations.

(6) Wastes legally disposed before [DATE RULE REVISION EFFECTIVE], provided the waste is not removed from the location of original disposal.

STATUTORY/OTHER AUTHORITY: ORS 469.470

STATUTES/OTHER IMPLEMENTED: ORS 469.525

DRAFT

DRAFT

Attachment 2

REVIEW COMMENT RECORD (RCR)	Document(s) Reviewed: OR Radioactive Waste Rulemaking "Part 1 revision"	Page 1 of 4
		Date (Response Due) 06/30/2023

Document(s) Reviewer (Name) Tom Sicilia, Matt Hendrickson, Max Woods	Date (Reviewed)
--	------------------------

Item	Commenter	Section	Comments	Comment Resolution
1.	LWV	0006(d)(A)	Comment: I appreciate insertion of a specific requirement at (A) for authorization from the Oregon Health Authority (OHA) certifying that sufficient systems, structures, and processes are in place to ensure safe handling and storage during temporary storage" "...First, I believe that specific reference/emphasis needs to be made to ensuring the inclusion of "appropriate employee training and protection"	Response: Licenses issued by OHA include health and safety provisions and training. ODoE is not responsible for these subjects Action Taken: accepted, refined OHA determination, added language about what should be in the plan -00xx(5)(d)(i)(A-D)
2.	LWV	0006(d)(B)	Comment: I appreciate ODOE's insertion at (B) of an outside limit on this type of storage. I request consideration of the addition of language indicating the consequences of failure to follow the rule, including for failure to effect legal disposal out of state by 180 days.	Response: an unlicensed waste disposal facility under ORS 469.525 would be subject to a notice of violation and subsequent penalties. To avoid this, an entity could apply for an RPS license or legally dispose the material within the allotted time. Action Taken: included 00xx(4) as a clause connecting the rulesets.
3.	OBI	0006(d)(A)	Comment: "leaves the regulated community exposed to meet an unknowable, undefined standard of what "Sufficient systems, structures and processes"	Response: The standards are well established with OHA and RPS authorities. Action Taken: Rephrased 00xx(5)(d) to reflect this for unlicensed facilities only
4.	OBI	0006(d)(B)	Comment: "our reservations relate to the potential that temporary storage of radioactive waste should or could be limited to 90 or even 180 days.." "imposing an inflexible 90 day temporary accumulation deadline" "allow generators to accumulate waste on site for up to one year without prior written authorization"	Response: It is in Oregon's interest that unlicensed radioactive materials be disposed of expediently to minimize negative impacts. Any accumulation of radioactive waste shall be done under a license. Action Taken: accepted, provided that the generator is acting under provisions of a RPS-issued license. Added language to that effect in section 00xx(5)(a)
5.	WM	0006(d)(B)	Comment: WM Proposes changes to the language in (B) as outlined in the changed text to clarify the requirement for authorization to store. WM supports an increase to 1-year in total, as the materials in question pose no significant risk to public health and safety during storage. The 1-year time frame may be necessary to accumulate sufficient quantities for shipment out of state.	Response: see 4 Action Taken: see 4
6.	OBI	050-00X0 Component 1	Comment: "we object to the term "likely"	Response: accepted Action Taken: removed likely, and edited section

REVIEW COMMENT RECORD (RCR)**Document(s) Reviewed:**

OR Radioactive Waste Rulemaking "Part 1 revision"

Page 2 of 4

Date (Response Due)

06/30/2023

Item	Commenter	Section	Comments	Comment Resolution
7.	OBI	050-00X0 Component 2	Comment: "reconsider the requirement for a person to report a materials "discovery" as a radioactive waste "as soon as possible , but within 10 days" " "As written, the proposed notice and reporting language will impose new compliance risk and administrative burden on regulated entities that are already doing their part to identify their waste as radioactive "	Response: see 4 Action Taken: edited section to reflect unlicensed facility. Clarified that notification would be expected within 10 business days for more time flexibility.
8.	LWV	00X0	Comment: "There should be a clear and complete description of the procedure the Department <i>must or will</i> implement in response to discovery of radioactive materials—to determine all factual matters related to the material, establish an enforceable timeline, and/or other requirements to develop a plan of action in response. The process should be clear, well publicized, timely, enforceable, and effective. The consequences of discovery of such materials without subsequent and timely reporting should also be spelled out"	Response: see 1 and comments on 0006(d) Action Taken: ODOE's Enforcement authority and penalty structure is established in a separate ruleset.
9.	WM	0020	Comment:" WM has expressed on several occasions that the inclusion of a lead-210 limit is costly to the regulated community and does not convey any additional public health and safety protections..." "Pb-210 can be present at a higher activity concentration than Ra-226, such as in some oil and gas waste streams that are concentrated in Pb-210, Pb210 is a low energy beta-gamma emitter, consequently, risks from external exposure are negligible. Generally, Pb-210 is relatively immobile in groundwater due to its tendency to adsorb onto solid particles and sediments." "Further, as Pb-210 is a low energy beta-gamma emitter, it is notoriously difficult to detect. Examining the laboratory data from nearly all pathway exemption reports to date indicates that Pb-210 is detected only ~30% of the time with gamma spectroscopy and ~50%"	Response: While Lead-210 itself is relatively low in radiotoxicity, its daughter product Polonium 210 is extremely radiotoxic and readily accumulates in aquatic organisms. Normally this isotope is regulated under the U-238 standard of 10 pCi/g (which includes daughters, assuming equilibrium). The majority of elevated analytical detection limits in pathway analyses are in samples with elevated Ra-226 and/or U-238. A exemption standard for enriched Lead 210 where common (fossil fuel related refining storage tanks, pipe, etc) is protective to the public, as a plugging of the equilibrium assumption loophole. Action Taken: Narrowed language in 345-050-0020(4) to indicate the exempt concentration applies to materials which have been found to be more commonly enriched in Lead-210.
10.	OBI	0020	Comment: "...lead-210 into the revised tables, OBI requests that ODOE provide this RAC additional time in which to consider any such changes as we are concerned about potential increased monitoring costs to the regulated community without corresponding benefit to public health and safety	Response: The issue of potential wastes enriched with Lead-210 has been discussed since 12/2021. Additional time to provide comment on the revised language will be available in the final 30 day RAC period and in the formal EFSC comment period. Action Taken: see 9

REVIEW COMMENT RECORD (RCR)**Document(s) Reviewed:**

OR Radioactive Waste Rulemaking "Part 1 revision"

Page 3 of 4

Date (Response Due)

06/30/2023

Item	Commenter	Section	Comments	Comment Resolution
11.	OBI	0025	Comment:...lead-210 into the revised tables, OBI requests that ODOE provide this RAC additional time in which to consider any such changes as we are concerned about potential increased monitoring costs to the regulated community without corresponding benefit to public health and safety	Response: see 10 Action Taken: see 9
12.	WM	0030	Comment: WM disagrees with the addition of "excluding NORM materials" . WM feels this language is too expansive as NORM is ubiquitous, and WM believes the conditions contained in this section adequately cover the exemption.	Response: agree - the NRC does not regulate NORM and therefore Norm would not be included in an NRC license for consumer products. Action Taken: Removed "Excluding NORM materials"
13.	WM	0030(3)	Comment: WM envisions a system where a site specific Radiological Monitoring Plan would be approved by ODOE in coordination with OHA..." Costs to the regulated entity for holding a transportation asset are significant and unwarranted. Additionally, the risks to the public and particularly the worker health and safety far outweigh the benefits for sorting through the 20 to 25 tons of waste in load to find the material."	Response: We are hopeful that a facility specific plan can find methods of demonstrating compliance to the greatest extent practical without creating undue cost or risk to workers. Action Taken: added 0030(4) and clarified what would be expected in the facility specific plan.
14.	ORRA	0030(3)	Comment: "Although the amount of radioactivity in the municipal waste is often small, detection systems used by solid waste facilities are often sensitive enough to detect radioactive contamination... Such material is deregulated by the NRC and the Department of Transportation (DOT)... In fact, more invasive procedures such as sifting through loads of municipal solid waste present a greater danger to solid waste workers.. common medical radioisotope (e.g., I-131 or Tc-99m) with a half-life of 120 days or less, the facility should be able to process and dispose of the radioactive material."	Response: It is our intention to have the facility-specific plan be readily implementable to document compliance with our rules, so that there is a way to confirm that the anomalous waste is metabolized medical waste. Action Taken: see 13
15.	WM	0035	Comment: At this time WM understands that no further revisions to the current Pathway Exemption process are being contemplated at this time. WM agrees with this approach as we agree these pathway exempt materials do not present significant danger and the current process provides adequate health and safety protections for the facility staff, the public, and the environment. WM therefore does not support any changes to the current pathway exemption process without the recognition of the many protections provided by modern disposal facilities for NORM bearing wastes.	Response: Outside of current scope Action Taken: Will address in future

REVIEW COMMENT RECORD (RCR)	Document(s) Reviewed:	Page 4 of 4
	OR Radioactive Waste Rulemaking "Part 1 revision"	Date (Response Due) 06/30/2023

Item	Commenter	Section	Comments	Comment Resolution
16.	OBI	0035	Comment: " Said differently, businesses that already call Oregon home and that safely dispose of pathway exempt materials with ODOE's prior knowledge and approval should not be subject to continued uncertainty as ODOE continues to consider future changes to its pathway exemption rules. Any such changes should be limited in application to businesses or materials not previously evaluated or approved by ODOE for disposal. Businesses operating under current ODOE approved pathway exemptions should be entitled to continue to rely on those exemptions (both at present and on renewal) for materials previously considered safe for disposal by ODOE."	<p>Response: the currently proposed rules exempts wastes that were legally disposed as long as they remain in place. The intent is to provide certainty that if the pathway exemption changes in the future, the waste will not have to be retrieved, provided it was disposed legally. If additional waste is identified that was not legally disposed, the plan of action will be assessed on a site-specific basis.</p> <p>Action Taken: A specific exemption removes legally disposed wastes (disposed under a pathway exemption) from further action provided they remain in place.</p>

Name2	Shirley Weathers	Andrew Lombardo, CHP	Jamie Jones	James Denson	Sharla Moffett	ODOE Response
<p>Is the Pathway Exemption framework still necessary and protective? (Relevant Rules: OAR 345-050-0035 through 0038)</p>	<p>a) Is it still necessary?</p> <p>As I understand it, the Pathway Exemption framework is one of four rule-based exemption mechanisms currently on the books, along with Exempt Concentrations, Exempt Quantities, and a collection of Specific Exemptions. Any or all of these are potentially subject to change as a result of SB 246 [ORS 469.300(23)(b)(A)] through the current rulemaking process. I don't feel adequately informed on the technical/scientific aspects involved to have a strong opinion about which of these mechanisms, including the Pathway Exemption, should be retained, modified, or replaced/eliminated. But one thing stands out as a critical test for this rulemaking process, including as we go through these discussions: Whether the resultant rules conform to the law and most specifically at ORS 469.300(23)(b)(A), i.e., "Materials identified by the council by rule as presenting no significant danger to the public health and safety [emphasis added]." I assume that, although the Attorney General's Opinion referenced in background materials included as a "given" acknowledges that the Legislature did not intend to ban all materials containing radioactivity, the council must 1) be bound in its decisions about "no significant danger" by science, 2) consider the safety of the current and far-future "public," and 3) comply with the long-held interpretation of ORS 469.300(31) that any evaluation of waste material to determine whether or not it qualifies as "radioactive waste" must occur as it is at the point of evaluation. There appears to be some interest in loosening various aspects of exemptions for purposes such as cost-effectiveness, administrative ease, simplicity, convenience, likelihood, etc. But it appears clear that the law requires that no other priorities must be pursued at the expense of the public, now and in the distant and unknowable future.</p> <p>b) Is it protective?</p> <p>There's a significant technical side of this that, again, is beyond my expertise, but for me there's a troubling inadequacy via the Pathway Exemption and across all of the mechanisms that offer exemptions: there appears to be nothing to limit cumulative impacts. This is the subject of Q#13 below, but I will raise it here in my first remarks because cumulative impacts appear to me to be among the most important issues on the table as Division 50 rules are under consideration.</p>	<p>The pathway exemption framework is necessary but needs revised/updated to encompass risk-based regulation revisions that have occurred federally and at the state level since the Oregon rule was last revised.</p> <p><i>[Note from ODOE: what specifically is meant by risk-based regulation? Is this referring to the Excess Lifetime Cancer Risk metric described by EPA? In this case, the relevant standard may be 12 mrem/yr to correspond to the upper end of the CERCLA risk range. What is meant by the state-level regulations?]</i></p>	<p>Based on information provided during previous RAC meetings, the current Pathway Exemptions do not appear to be protective. However, DEQ defers to ODOE and other experts on this question, and recommends that any changes to current rule ensure clear compliance points.</p>	<p>Yes, the pathway exemption framework is still necessary and is very protective, however revisions are necessary. This basis for the pathway exemptions need updating, see comments below.</p>	<p>Yes, the pathway exemption framework is still necessary and is very protective. Our detailed comments below explain revisions that we propose to the Pathway Exemption framework for consideration in this rulemaking.</p>	<p>Regarding cumulative impacts, two thoughts:</p> <ol style="list-style-type: none"> For surface disposal (not in a landfill), the impacts from the co-located disposal of multiple pathway exempt wastes are incorporated in the current rule by assuming the waste occupies a semi-infinite plane upon which a house is built. [add discussion of assumed thickness of the waste layer and how the dose doesn't change after a certain thickness is reached- from the older discussion]. In essence, each pathway exemption assumes that an entire landfill is composed of that one waste. As described in the February 2022 RAC meeting, the current statutory definition of radioactive waste in Oregon is clearly based on the waste itself, not taking into account context of its disposal (e.g., shielding from land cover). The original Division 50 rulemaking documentation supports this interpretation, as well as the concept that definition of radioactive waste should result in "no permanent commitment of land" from a radiological risk perspective. While not allowed in Oregon as described above, the Argonne National Lab study from 2015 (https://deq.nd.gov/Tenorm/ArgonneStudy%20NL-NDDH%20TENORM%20Landfill%20Study%20ANL%20EVS-14_13%20Final%20Report.pdf) evaluated the future health risks associated with a residential scenario for a landfill that had 10% of its volume filled with TENORM. To maintain doses below 100 mrem, the concentration limit was 130 pCi/g Ra-226 assuming all waste was buried 2m deep. If depth was increased to 3m, the concentration limit would increase to 360 pCi/g (Table 6.1). This study bounds the realistic potential cumulative risk in an Oregon landfill, as the real proportion of TENORM waste in landfills is far lower and the depth of disposal is likely to be deeper than 3m.

Commented [BJ*O1]: The big idea (saved for posterity)

- Requires statutory change
- Name the waste you don't want (e.g., fracking waste) rather than prohibit based on radioactivity?
- Create a path for risk-based management of landfills. Define "NOT radioactive waste landfills" that can nonetheless accept radioactive materials so long as they won't cause the landfill to become radioactive.
 - 25 mrem or 12 mrem standard (using Argonne study as basis, 25 mrem equivalent = 32.5 pCi/g if assuming 2m of cover material; 90 pCi/g if assuming 3m). 12 mrem standard with 3m cover = 45 pCi/g.
 - above concentrations would allow most Oregon zircon wastes but prevent the OWL fracking waste example based on weighted average in that case.
 - Restrict % of TENORM allowed (Argonne study assumed 10%)
 - Include a well driller scenario to ensure no "permanent commitment of land" from the original basis documents. May affect concentrations described above b/c the Argonne study did not include a driller above the waste.
- Restrict to new landfills only? Addresses the % of TENORM uncertainty from past practice and reassures current host communities.
- Designate TENORM a special waste subject to DEQ oversight?
- ODOE retains responsibility for approving waste acceptance criteria to ensure the dose limit is not exceeded.

Commented [BJ*O2]: Notes to self to incorporate in rule draft:

- Add lead-210 to Table 1
- Clarify Table 1 footnote re: equilibrium
- Convert units in Table 3
- Clarify that all NORM nuclides need to be analyzed and fractionated in the leach test 0038.
- Compare radon risk of crawlspace model vs. default foundation in RESRAD – which is more restrictive?
- Discuss air changes per hour in radon model
- Clarify blending and averaging rule

Should additional exposure pathways be included in the Pathway Exemption rules? (e.g., plant uptake, livestock) (Relevant Rules: OAR 345-050-0035)

In view of the supremacy of the charge to protect the public health and safety, if there are pathways that pose risk that are currently outside of the scope of required evaluation of waste for safety, the answer would seem to need to be yes. Beyond that, I'm not clear enough about the science and therefore can't anticipate what additional pathways might look like.

More information, including perhaps scenarios indicating how these or other radionuclide-bearing materials potentially affect the public on the ground, would be helpful.

For now, though, I noted that the discussion in RAC #3 around this particular subject matter seemed to trigger expressions of interest in developing different set of exemption standards for landfills and land spreading (some scenarios of what that entails could be helpful). **But would evaluating radioactivity levels based on the means of disposition rather than as is at the time of evaluation comply with the law?** (See Q#3 and Q#11 below.)

Yes. Consistent with the current federal and state risk-based regulation revisions, the public exposure limit of 100 mrem per year Total Effective Dose Equivalent (TEDE) and the dose (risk) assessment methodology associated with the risk-based limit, to convert from 100 mrem TEDE to concentrations of specific radionuclides may be implemented. The dose (risk) assessment includes up to nine environmental pathways (including the 3 used in current pathway exemption methodology) as applicable. This framework allows for up to 100 mrem/year of public exposure sum-total of all relevant pathways.

[ODOE Note: *How would specifying a TEDE materially change the current pathway exemption? Would it require combination of the three existing pathways, plus potentially others including inhalation and ingestion? For reference, surface disposal of 5 pCi/g of Ra-226 and Pb-210 in a RESRAD default scenario would result in 368 mrem/yr to a resident, 278 mrem of which comes from radon. Plant ingestion accounts for an additional 55 mrem, and gamma adds 32 mrem.*

DEQ recommends all potential exposure pathways be included.

From our perspective, **a landfill disposal scenario must be recognized** that incorporates risk-based analyses of the protections that safe landfill disposal of these materials affords.

If pathways such as soil ingestion, plant ingestion following plant uptake, etc., are to be considered, the exposure pathways need to be evaluated for both the land application scenario and landfill disposal using a risk-based approach. This risk-based analysis should consider **environmental fate and transport properties** of the radionuclide in question, taking into account the pertinent environmental setting and **realistic receptor exposure scenarios**.

Additional exposure pathways **should be included provided the current approach is modified accordingly**, e.g., allowances for the landfill disposal scenario. As is, the current approach is very conservative, and the consideration of additional pathways within the existing framework would be needlessly prohibitive. The pathway exemption framework should **either be maintained as is or modified in its entirety to include additional pathways of exposure while also acknowledging when pathway exempt wastes are disposed of in landfills that have covers and other barriers that prevent exposures**.

The current approach considers external gamma radiation (OAR 345-050-0036) and indoor radon inhalation (OAR 345-050-0035(5)) exposure pathways. In addition, OAR 345-050-0038, the water pathway, assesses ingestion of radioactive material present in effluents. **It is not clear if the derivation of the OAR 345-050 Table 3 limits included multiple exposure pathways beyond direct ingestion**, such as plant uptake of the effluent followed by human consumption, animal consumption of the effluent and/or plants followed by human consumption, etc. **The limiting pathway however would be direct consumption of the effluent**. The federal guidance related to effluent concentration limits (e.g., Table 2 of Appendix B in 10 CFR 20) can be used to demonstrate this.

Given how conservative the current approach is, consideration of additional pathways would need to be analyzed extensively to determine if they would be limiting or inconsequential. For example, if the OAR 345-050 Table 3 values are not currently inclusive of additional water pathways (such as plant uptake and ingestion), an analysis would need to demonstrate that pathways beyond direct effluent consumption can have a consequential effect on dose. Additionally, the methods and assumptions used in developing these limits should be fully transparent, like the federal Appendix B Table 2 limits referenced above.

If pathways such as soil ingestion, plant ingestion following plant uptake of soils, etc., are to be considered, a new set of concentration limits would need to be determined for the environmental soil medium. **These limits should be realistic and based on resulting soil concentrations at a site and not on waste concentrations.**

Table 3 limits are compared to the leachate concentrations where the ability of a radionuclide to leach out of the waste is dependent on both the elemental properties of the radionuclide and the waste form in question. If soil-based pathways are to be considered, a similar analysis used to determine Table 3 values would need to be performed for soil concentrations. **As with Table 3, these limits would apply to environmental media and not the waste itself.** This analysis should consider environmental fate and transport properties of the radionuclide, assumed site characteristics of a typical landfill (such as caps, spreading, etc.), and realistic

The ODOE interpretation of OSR 469.525 and ORS 469.300, including the historical underpinnings of the Division 50 ruleset, provide clear guidance that under the current statutory structure we are not able to use the features of the disposal facility (e.g., land cover or liners) as a basis to determine that the waste itself is not radioactive. Once Oregon determines that a waste is not radioactive, its disposal is not limited to certain depths within landfills even though the reality is that most pathway exempt wastes have been disposed in landfills.

Commented [SO3]: what about a waiver to plant based uptake if an aquatic tox report from a lab indicates that the material can not sustain plants- but otherwise a cumulative assessment must pass gamma, water, and uptake at less than 100, and pass radon- basically the same pathway tests we have now plus plant uptake taken from resrad at default parameters?

Commented [BJ*O4R3]: I don't think the material has to sustain plant roots for the radioactivity in the material to migrate and be uptaken. Now what if we performed some kind of plant uptake analysis based on the leachate lab results instead of based on the concentrations in the waste? I don't know how it's done (or if RESRAD already approximates this), but it might get closer to the true pathway of concern.

Also let's remember that in 99% of cases, plant uptake is not physically viable unless the entire landfill is overturned. Regulating to this standard across the board is a pretty severe move.

receptor exposure scenarios. As an example, the current Ra-226 concentration in waste is 5 pCi g⁻¹ (OAR 345-050-0030(2)). This value likely comes from the EPA's 40 CFR 192.12 limit of 5 pCi g⁻¹ for residual radioactive materials from inactive uranium processing sites. This limit is based on a total effective dose equivalent (TEDE) of 100 mrem yr⁻¹ from all exposure pathways related to Ra-226 (excluding radon). However, the EPA's use of the 5 pCi g⁻¹ limit is different than that used by the state of Oregon. The EPA applies this limit to the top 15 cm of soils averaged over 100 m² whereas Oregon applies it directly to waste concentrations. The EPA is accounting for dilution from native soils and averaging over a given area, allowing for a more realistic analysis of potential exposure pathways. It would be overly conservative to assume that the Ra-226 concentration in a waste is equivalent to the environmental soil concentration used in exposure pathways for which a hypothetical receptor would be exposed to externally, grow and consume crops from, etc.

Commented [BJ*O5]: This is true because we assume the waste is spread in a semi-infinite plane. It essentially becomes the soil and is therefore equivalent to the EPA limit.

<p>Should pathway limits be assessed individually, or as a cumulative impact? If cumulative, should radon be included, or as a standalone, separate assessment?</p>	<p>Cumulative impacts appear to me to be among the most important issues on the table as Division 50 rules are under consideration. From my lay perspective, the extraordinary duration of the dangers of radioactivity and the quantities of radioactive waste that are generated and need to be disposed of, I have deep concerns that individual assessments are largely meaningless in terms of their ability to protect the public health and safety unless the rules are augmented to include some way to address accumulation of radioactivity. Unless I'm missing something, while Oregon's overall approach is superior to other states, it still appears all of the current rules used to evaluate whether waste is exempt versus radioactive (illegal) apply to individual quantities at the time of evaluation, without any regard to accumulation of similarly exempted waste over time. What this seems to mean is that Oregon's overall waste disposal regulatory construct, allowing for exemptions of radioactive material as it does, simply fails the test of ensuring "no significant danger to the public health and safety."</p> <p>The absence of a response to accumulation of exempted radioactive waste level also seems to open the door to strategic manipulation by producers, shippers, etc., of such waste. In a hypothetical case involving presentation at the gate of a landfill, assume one truck just barely passes muster under whatever Pathway Exemption may be devised. But what if that truck is actually the first in a convoy of trucks all with similar loads, managing somehow to present themselves as individual loads? What if another similar convoy appears the following day, the day after that, the week after that, and so on? And I don't believe we can just look at the potential for accumulations in landfills. (See also answer to Q#13 below.)</p>	<p>The public exposure risk-based limit combined with risk assessment to determine concentrations of individual radionuclides (see number 4) framework allows for up to 100 mrem/year of public exposure sum-total of all relevant pathways.</p>	<p>DEQ defers to ODOE and other experts on this question, and recommends that any changes to current rule ensure clear compliance points.</p>	<p>We support limits being developed based on cumulative impact to the affected receptor as this is how the exposure impacts the receptor, with the exception of radon. Radon is regulated separately as indoor radon is the most important source of radiation exposure to the public and is therefore appropriately regulated separately by most regulatory bodies.</p>	<p>For simplicity, the current approach should be maintained or limits should be assigned and assessed on a cumulative basis, with the exception of radon. The EPA regulates radon separately through 40 CFR 192.02 with a limit on the release to atmosphere of 20 pCi m-2 s-1. They also remove radon and its progeny from the 40 CFR 190.10 RGP of 25 mrem yr-1 to any member of the public as the result of radioactive material discharges to the environment from the uranium fuel cycle operations. There are two important scientific and technical reasons for the distinction between radon and other radionuclides. First, radon is the only naturally occurring radionuclide that is an inert gas. Its emanation from radium-bearing soil, rock, and building materials results in substantial exposures in indoor environments from the inhalation of the short-lived radon progeny which is responsible for most of the dose to the lung. As a result, it is unique among the radionuclides with regard to the importance of this exposure pathway. As a result, indoor radon is the most important source of radiation exposure of the public. More importantly though, the relationship between exposure to short-lived decay products of radon in air and the associated risks (i.e., lung cancer) can be estimated, with some uncertainty, from epidemiologic studies in various groups of uranium miners. Therefore, the risk posed by exposure to indoor radon can be estimated without the need to develop models for estimating doses to radiosensitive tissues of the lung from irradiation by alpha particles after inhalation and without the need to apply assumptions about the dose per unit intake and the risk per unit dose. Radon is unique among the radionuclides in this regard is therefore appropriately regulated separately by most regulatory bodies.</p>	<p>Re: Weathers: The concept of the comment is a valid concern, which sparked deeper reflection. Because the current rule envisions a semi-infinite plane of material, in a sense it already assumes a "landfill" full of just that one waste in question. Therefore, the pathway exemption evaluation of a waste at X pCi/g of Ra-226 is already built on the assumption that an entire convoy of trucks could have disposed material at that concentration on the ground surface. The reality is that such wastes are commingled with less concentrated non-NORM bearing wastes when disposed in landfills.</p> <p>See also the prior comment about the Argonne study and the 10% TENORM inventory assumption. No landfill in Oregon has come close, but we could potentially adjust the "expected period of waste generation" to include consideration of multiple streams to the same facility. This gets into regulating a facility instead of regulating the waste, however, and it creates differing definitions for a given waste stream depending on whether it is going to a hypothetical landfill that has already accepted large quantities of NORM in the past vs. one that has very little NORM.</p> <p>Staff agrees with the comments that advise keeping the regulation of radon exposure separate from the cumulative exposure pathway dose, consistent with federal regulations.</p>
---	---	--	---	---	---	--

Commented [SO6]: this is an interesting thought experiment. if all the pathway wastes in a landfill pass the leachability test (including the leachate itself), is there really a risk of accumulating radium in water? lead would be the potential problem, but that has a short ish half-life, no?

Commented [BJ*O7R6]: Agreed. I don't know why this hadn't occurred to be before when we pondered cumulative effects of multiple pathway streams.

<p>Is the 7-day deadline for disposing radioactive waste appropriate? What alternatives should be considered? (Relevant Rules: OAR 345-050-0006)</p>	<p>There seems to be some agreement that seven days is inadequate/unrealistic and the flowchart presented seems to demonstrate that, as well. I'll look forward to seeing alternatives agency staff present, but at the same time, it seems clear that the prohibitive intent of the current rule and the law it implements are deliberate. The previous RAC on Division 29 rules focused concerted attention on reinforcing the state's prohibition on radioactive waste. Part of that effort stemmed from a commitment to greater clarity about Oregon's commitment to accepting/storing radioactive waste. Among other actions, violation of the current OAR-050-0006 was upgraded to a Class II violation and made punishable by fines and other costs. No one would advocate for retaining an unachievable deadline to eject offending waste from the state, but whatever is devised to replace the current rule must not send a message to external producers or transporters of this waste either. When unacceptable waste is identified, the state's response must be reasonable, but at the same time, it must be clear that it must be gone as soon as reasonable possible after discovery/assessment as such. Another potential issue that hasn't really been considered is that a "we'll work with you" approach could result in administrative and/or storage nightmares for agencies, landfills, and possibly private landowners or public land managers.</p>	<p>7 days is not sufficient to arrange for transportation and disposal of the waste- suggest replacing the 7 day provision in the rule with a 45 days- longer hold times should be allowed if the generator can demonstrate active efforts to arrange for proper disposal.</p>	<p>DEQ defers to ODOE and other experts on this question.</p>	<p>As outlined in the RAC meetings in the presentation, 7 days is not sufficient to arrange for Transportation and Disposal of their wastes. We suggest the removal of the 7-day provision in the rule and replace it with a 45-day period, longer hold times should be allowed if the generator can demonstrate active efforts to arrange for proper disposal to the agency.</p>	<p>As it is currently worded, OAR 345-050-0006 applies to the management of radioactive wastes when disposed. The current rule language does not regulate how long a waste can be temporarily accumulated at the site of its generation or use (e.g., at a facility exempted from or operating under a specific or general radioactive materials license) prior to its disposal. Instead, we understand this rule applies once a material that has been properly characterized as Oregon radioactive waste is removed from its place of generation or use, for disposal. In short, this rule makes clear that radioactive waste being processed for disposal has 7 days to leave the state of Oregon for management at a licensed radioactive waste disposal site. We see no reason to reconsider or revise that requirement.</p>	<p>Staff proposes a limit of 90 days until waste classified as radioactive waste must exit the state for disposal, though longer hold times may be allowed if the generator can demonstrate to the department that action has been taken to remove the waste as soon as reasonably possible after the determination that the waste is not lawful for disposal in state. This proposed limit is based on the realistic quarterly milk-run schedule, and "no greater than 90 day storage" under RCRA being allowed before you become a hazardous waste storage/treatment facility.</p>
--	--	---	---	--	---	--

Does the 500 millirem gamma dose limit adequately protect public health and safety? Should an alternative dose limit be used for the gamma pathway test, such as aligning with federal limits? If so...

Staying within currently accepted dose and effluent levels appears to call necessarily for a reduction in the annual millirem limit **at least to 100** to correspond with current federal standard of health and safety. However, I would appreciate discussion of an even lower exposure limit. Jeff mentioned **25 mrems have been seemed necessary "in some unrestricted uses."** I don't see that there was further discussion of that, but would like to see it pursued. Also, the EPA limits for restoration of Superfund Sites could warrant exploration. If the federal agency calls for these limits to protect public health and safety under Superfund circumstances, might we want or even feel compelled to meet those limits? Acknowledging that significantly lower limits may not be popular for some of the reasons I named in the last paragraph of Q#3a above, the law mandates that public health and safety come first.

During RAC#3, there was mention of an option to lower the mrem limit to 100, but then simultaneously raising the concentration limit above the current 5 pCi/g. I believe I understood the motivation there to be some kind of technical consistency, but returning to the issue of messaging, might there be a potential for unintended consequences if we make Oregon' allowable concentration ceiling higher than other minimal TENORM-producing states? While we cannot ban "fracking waste" per se, the Department, Legislature, and the public got fully behind the statutory and rulemaking effort we are currently engaged in specifically to prevent illegal dumping like what occurred at Arlington from ever happening again and to give the state effective mechanisms to enforce and respond if it does. Retaining the current 5 pCi/g is another key safeguard we have against attracting unsafe waste—a measure consistently understood across other states. Oregon does not want to become known as having recently decided to raise its limit. It is also a demonstration of commitment to the consensus around passage of SB 246.

Another option for change that has been raised—setting one exposure limit rather than retaining the current three (for land, water, and air). Acknowledging the complex technical aspects of this, including why such a change would somehow be preferable, I nonetheless don't believe the overall RAC (and ultimately the council) has had adequate information on how this would work and why it would fulfill the legal responsibility to best protect the public health and safety from significant danger. Ingestion from air versus water seems to have different medical implications, as well.

Consistent with federal and other state regulations, a public exposure limit of **100 mrem/year** TEDE may be used.

DEQ defers to ODOE and other experts on this question. However, DEQ recommends considering not just federal limits.

Given the land application basis and the highly conservative other assumptions specifically incorporated into OAR 345-050-0036(1)(b) that tie the gamma survey results to the yearly dose limit the **500 mrem per year, the dose limit threshold is protective** of public health and safety especially if the disposal scenario is a landfill.

If the new rules to limit the gamma exposure to 100 mrem per year, **updated exposure assumptions that are more consistent with a landfill environmental setting (nearest resident vs house on waste) and engineered environmental protections need to be recognized and included.** Container geometries included in the regulations should be expanded to include containers that are more representative of those actually used in the state, e.g., **supersacks or 20-40yard steel containers.** This can and has been done by developing correction factors using software such as MicroShield®.

OAR 345-050-0036(1), which is used to determine compliance with OAR 345-050-0035 (the Pathway Exemption), requires that the **disposed naturally occurring radioactive material (NORM)** cannot result in a dose to individuals greater than 500 mrem per year. As stated in OAR 345-050-0036(1)(b), evaluations against the 500 mrem dose limit are completed by taking actual field gamma radiation surveys and comparing the results to the levels provided in OAR 345-050-0036(2). As outlined in OAR 345-050-0036(2), the limiting radiation survey result has been determined to be 18 mR per hr above background and is based on a survey at 1 foot from a standard 55-gallon drum or a box measuring 1.5 x 1 x 2 feet (H x W x L). The underlying assumptions specifically incorporated into OAR 345-050-0036(1)(b) that tie the survey results to the yearly dose limit include: (1) a person lives in a house above the waste; (2) that person spends 90 percent of their time in the house; and (3) the house is built on a homogeneous, semi-infinite slab of NORM with a two-foot crawl space and a two-inch wooden floor. The exposure to individuals inside the house is assumed to occur at a height of one meter above the wooden floor. **Given these pessimistic assumptions, the 500 mrem per year dose limit is reasonable.** An alternative would be to reduce the gamma exposure limit to 100 mrem per year with updated exposure assumptions that are more consistent with reality. This could include allowances for the environmental and engineered factors applicable to landfills to be taken into account and applying the concept of a **nearest resident** rather than a home built on top of the waste. Further, we recommend expanding the geometries included in the regulations from the 55-gallon drum and the box described above to containers that are more representative of those actually used in the state, e.g., supersacks. This can be done by deriving correction factors using software such as MicroShield®.

Because the OHA public dose limit is 100 mrem/yr, it seems most appropriate to maintain this limit for consistency with federal regulation and other existing standards in Oregon that represent no significant danger to public health or safety. This standard is conservative for the vast majority of wastes that in reality will be disposed in a landfill and therefore present far lower doses at the surface – likely to be indistinguishable from background radiation levels.

Consistent with other RAC feedback, the 100 mrem/yr standard should be inclusive of all pathways excluding radon.

RAC members should be aware that if this alternative is pursued, the Pathway Exemption becomes **moot** because the corresponding concentration of Ra-226 will be approximately 5 pCi/g when not taking landfill cover into account. See prior response for discussion of this point.

If in the future an alternative is pursued that would allow credit to be taken for landfill protective measures such as land cover, staff would advocate the dose limit for the landfill for purposes of setting waste acceptance criteria should be based on 25 millirem/yr (the unrestricted land use standard for NRC nuclear site decommissioning) or 12 millirem/yr (the upper bound of the CERCLA risk range per EPA).

Commented [BJ*O8]: Rule actually says accumulation of material, not disposal.

Commented [BJ*O11]: For example, if your leachate is at 50% of its standard when multiplied by 20, that is the equivalent of 12.5 mrem assuming the leachate is a drinking water source. This would leave 87.5 mrem to apportion between direct gamma and plant uptake if the latter is included as a new pathway. The easiest way to do this however is to simply fall back to 5 pCi/g for any surface disposal consistent with the UMTRA rule and the plant uptake + gamma RESRAD run performed for the February 2022 meeting.

Commented [BJ*O9]: Basically how ODOE justified 500 back in 1993. Now we have to ask, do you keep a high dose with pessimistic assumptions, or a lower dose with more realistic assumptions, or the most stringent of both and a lower dose with pessimistic assumptions?

Historic land spreading is a case wherein someone might have opportunity to build a house on soil with wastes above 5 pCi/g if future zoning did not prohibit it. This might be a good case study example when discussing these responses at the next RAC meeting.

Commented [BJ*O10]: I would not advocate a nearest resident approach. This assumes a landfill could never be built upon, and we know there are examples where this has been the case. It also relates to the "permanent commitment of land" concept and the idea that rad should not be the committer. This all of course assumes we had the ability to take credit for land cover.

Are the current methods for estimating the potential gamma pathway exposure appropriate, specifically, the use of a standard container-geometry and 18 microrentge n per hour threshold and the asso...

Likely a critical issue, but I don't believe I have enough of an understanding to comment.

The current methods are antiquated and difficult to apply to a variety of scenarios. Using the 100 mrem/year TEDE limit and Department of Energy (DOE) developed and widely used dose assessment software RESRAD, default concentrations for key radionuclides can be derived and used for waste generators and landfills that do not want to invest time/resources into a site-specific assessment. These can be included in the rule change. The option to perform a site-specific assessment and submit to the State for approval can also be included, similar to the current pathway exemption method.

DEQ defers to ODOE and other experts on this question.

See Question #7. Current methods should be updated to be more consistent with current practice, e.g., updated building codes and practices, landfill exposure scenarios, new waste geometries, etc.

For landfill disposal the environmental setting and engineered protections need to be recognized. While institutional controls are likely to be lost at some point in the future, a common-sense approach must be exercised in making assumptions that a person might build their house directly on top of 55-gallon drums that are visible.

The gamma exposure measurements of industrial wastes over the last several years show that containers of industrial wastes exhibit wide variability. Thus, we propose employing averaging of the gamma measurements on an individual container versus the current practice of using the highest reading. Averaging logic is currently supported in several aspects of the pathway exemption process.

Finally, from a gamma exposure measurement standpoint, the gamma exposure pathway cannot be reduced to 100 mrem yr-1, while simultaneously not recognizing the model assumptions need to account for real world environmental protections. Applying the 100 mrem yr-1 threshold using the current model would require the measuring of gamma exposure rates at or below 3.6 µR hr-1 above background. This measurement and all others below it cannot be accurately and confidently distinguished above background.

See #7 above. Current methods should be updated to be more consistent with reality, e.g., updated building codes and practices, landfill exposure scenarios, new waste geometries, etc.

In particular, landfill characteristics should be accounted for. While it may be reasonable to assume that institutional controls will not be maintained forever, the Department's rules should apply a measure of common sense. For example, it is not sensible to assume that a person could build directly on top of 50-gallon drums that are still visible. And if the assumption is that these waste containers are no longer distinguishable as wastes thereby causing an individual to unknowingly build on them, then one should also be able to assume that the waste constituents have been mixed with environmental media such as soil, thereby diluting the radionuclide concentrations.

In addition, the gamma radiation readings taken for purposes of OAR 345-050-0036 should be consistent with the ultimate purpose of controlling annual doses from representative waste materials to below the limit (currently 500 mrem yr-1). Toward that objective, rather than evaluating field gamma radiation exposures by reference to the highest reading measured around the container in use, the Department's rules should authorize multiple readings to be taken and averaged over pre-determined locations on the approved waste containers. This type of logic is used in EPA regulations for Ra-226 concentrations (40 CFR 192.12) where the concentration is averaged over 100 m2. More importantly, this same logic is already used by the Department when determining compliance with OAR 345-050-0038 effluent concentrations. At least four representative samples of the waste steam are analyzed using EPA Method 1312 according to OAR 345-050-0038(1)(b).

The 18 µR hr-1 limit is directly correlated to the 500 mrem yr-1 gamma exposure radiation protection guides (RPG) from an infinite source at the same concentration located under a resident's home. In selecting the highest reading off the waste container, no credit is given to un-even source distribution and volumetric averaging within a given container. As a result, the maximum dose possible is 500 mrem yr-1, with an average or likely dose being something less. Combining this logic with the assumption that one builds directly on the exposed waste container creates a point of compliance that is unrealistic to meet if a lower gamma exposure limit were proposed without the use of a more realistic exposure model. A more realistic exposure model would lead to a higher allowable exposure rate reading on a waste container, and make compliance measurements more

One purpose of the gamma pathway interpretive rule was to allow a field screening method to demonstrate compliance without requiring frequent laboratory analysis to demonstrate derived concentrations continue to be met.

A threshold value of 5 pCi/g already exists for 226 in the specific exemptions of the rule, and concentration-based limits for other radionuclides also exist in Table 1 of the rule.

While the 55-gal drum is used for rule purposes the rule is not built on the assumption that waste is packaged in drums. Therefore it is reasonable to consider that a house might be built on NORM material that is indistinguishable from regular soil.

The point about a 100 mrem/yr standard not being distinguishable from background is true the barrel test used in the current pathway exemption. In a standard 20-yd box, the equivalent of 100 mrem/yr would be between 11 uR/hr to 19 uR/hr (based on Jeff's PPT, but not to be confirmed in Microshield). These levels have been demonstrated to be detectable by portal screening equipment.

Commented [BJ*O14]: Drums aren't forever. Majority of waste we know of was not in drums.

Commented [BJ*O12]: There is considerable uncertainty about the mixture of waste in a large box like a rolloff, so keeping to the highest point does make sense to me as a responsible precaution. The rule allows a person to mix their container if they get a hot spot, which is a physical version of "averaging" in that box.

Commented [BJ*O15]: Interesting line of argument that may hold true in a landfill credit scenario that has been uncovered after waste was mixed during disposal. However, if there is a layer of contaminated soil in an as-found condition, the mixing would have already occurred prior to the point of determination.

Commented [BJ*O13]: This is only true of a 55-gal drum. In a larger box, the equivalent of 100 mrem/yr would be between 11 uR/hr to 19 uR/hr in a 20-yd box (needs to be confirmed in Microshield). These levels have been demonstrated to be detectable by the portal alarm at CWM as confirmed by hand wandling.

Commented [BJ*O16]: Does this assume the entire 100m2 is accessible? Different from a 20-yd box that is self-shielding the waste in the center of the box. In a drum, there is less self-shielding involved, so an average in this case may be reasonable but likely not all that variable in so small a geometry.

Commented [BJ*O17]: In practical terms, we approve an exempt concentration (e.g., 20 pCi/g) based on an annual average from the facility, then derive a uR/hr screening value that assumes all waste in the box is at that concentration (e.g., 50 uR/hr). One small area containing 20 pCi/g would appear lower than this screening value due to gamma dilution from the other waste in the box. A hotspot significantly higher than 20 pCi/g might appear to exceed the 50 uR/hr threshold, necessitating additional investigation and reasoning why this box of waste is consistent with the facility's pathway exemption.

If the pathway exemption goes away, then the uR/hr limit for a box would be ~11 uR/hr assuming that whole box contains waste at 5 pCi/g. If any part of the box exceeds 11 uR/hr, then an isolated area of the box clearly contains waste exceeding 5 pCi/g enough to shine through. If we assume a semi-infinite plain containing the contents of this heterogeneous box, then some averaging of screening results may be appropriate or else we risk declaring a box full of radioactive waste that on average would not exceed 5 pCi/g.

OTOH, a hot bucket in an otherwise clean load is just the kind of red flag that portals are often intended to catch.

The Rule allows physical mixing of a box to "average out" the waste.

feasible.
If the gamma exposure pathway was reduced to 100 mrem yr-1 and the model assumptions remained the same, one would need to be capable of measuring exposure rates at or below 3.6 $\mu\text{R hr}^{-1}$ above background. According to the Health Physics Society (<https://hps.org/publicinformation/ate/faqs/radiation.html>), typical background radiation levels are $\sim 10 \mu\text{R hr}^{-1}$, but can vary considerably. Given the presence of statistical fluctuations in survey instrumentation readings, it is nearly impossible to accurately and confidently distinguish 3.6 $\mu\text{R hr}^{-1}$ above background.

Commented [SO18]: yet the portal monitor seems to do this regularly.

Commented [BJ*O19R18]: Agreed, but the portal might read 3 while a hand measurement would show 10 or 15 at the hottest spot.

<p>Are the current methods for estimating the potential air and water pathways appropriate? Would you suggest any alternative methods to those described in rule? (Relevant Rules: OAR 345-050-0035 and...</p>	<p>No comment.</p>	<p>See answer to number 8. RESRAD includes modeling of all air and water pathways.</p>	<p>DEQ defers to ODOE and other experts on this question.</p>	<p>The current methods for estimating air and water pathways are overly conservative and therefore highly protective, but should be updated as described in #7 and 8. Per #5, if the regulatory framework is updated to require pathway specific limits, then the pathways need to be clearly defined and new, updated models for calculating doses allowed.</p>	<p>The current methods are overly conservative and therefore protective, but should be updated as described in #7 and 8. Per #5, if the regulatory framework is updated to require pathway specific limits, then the pathways need to be clearly defined and new, updated models for calculating doses allowed.</p>	<p>The RESRAD modeling for water pathways would require consideration of the depth to the water table, Kds for waste in soil, and other site-specific factors of the disposal location, and therefore is less conducive to standardized testing based on the waste itself.</p> <p>In addition, the existing 0038 rule was benchmarked against RESRAD at the time of its writing and was found to correlate well with the results of the SPLP test. The RESRAD assumed 100 pCi/g of Ra-226 with varying key parameters to evaluate a range of values and assess model sensitivity. The SPLP results correlated reasonably well with the anticipated concentrations in a shallow aquifer 100 meters downgradient from the source. The benchmarking did not account for a thicker vadose zone or a lower precipitation rate consistent with a landfill cap.</p> <p>Staff propose to keep the existing 0038 methodology, with minor modifications and clarifications.</p>
--	--------------------	--	---	--	---	---

Are the current methods for estimating the potential radon pathway appropriate? Would you suggest any alternative methods/parameters to those described in rule? (Relevant Rules: OAR 345-050-0035)

No comment.	See answer to number 8. RESRAD includes modeling of radon pathways.	DEQ defers to ODOE and other experts on this question.	The current method is appropriate however the input parameters, e.g., house characteristics and air exchange rates, should be updated to reflect current industry standards which might affect radon diffusion into the structure. Direct correlation between Ra-226 concentrations and Rn-222 indoor air concentrations cannot be made due to wide ranges in material-specific radon emanation rates, therefore using current radon emanation measurement techniques should be continued	The current method is appropriate however the input parameters, e.g., house characteristics and air exchange rates, should be updated to reflect current knowledge as discussed below. Currently, Oregon requires that wastes do not produce an indoor Rn-222 concentration greater than 3 pCi L-1, or one-thirtieth (1/30) of a working level (WL) in a home built directly on the waste site (OAR 345-050-0035, Table 3). This limit is consistent with the EPA's limit of 0.03 WL (40 CFR 192.12). The evaluation assumes that any house built on ground contaminated with Ra-226 has an 8-foot-high ceiling on the first floor, has one complete air change per hour, and has a foundation constructed to meet the Structural Specialty Code (State of Oregon Uniform Building Code) in effect on March 1, 1979, without allowance for any special construction or treatments designed to reduce radon diffusion into the structure. The application of these building codes should be reevaluated and the hypothetical house should be updated accordingly. The evaluation also bases the relation between radon-emanation rate and radium concentration upon experimental measurements on material intended for disposal. This practice should continue as a direct correlation between Ra-226 concentrations and Rn-222 indoor air concentrations cannot be made due to wide ranges in material-specific radon emanation rates.	RESRAD as designed assumes a concrete slab construction. A crawlspace construction as described in the original rule is difficult to model using the RESRAD code without additional parameter research. The existing ODOE radon model is sufficient to demonstrate compliance with the radon portion of the rule.
-------------	---	--	--	---	--

Commented [BJ*O21]: Benchmark a basement scenario and a slab construction scenario to make sure the crawlspace is the limiting model?

Commented [BJ*O20]: Agree that we should do this. Manufactured homes?
<https://www.oregon.gov/bcd/codes-stand/Documents/md-2010omdisc-codebook.pdf>

https://www.oregon.gov/oha/PH/HEALTHYENVIRONMENTS/HEALTHYNEIGHBORHOODS/RADONGAS/Documents/Appendix%20F_Radon%20Control%20Methods.pdf

(radon mitigation required in some places, but not statewide)

Considering existing statutes, should protection via land cover as a result of disposal be given credit when making a pathway exemption determination? (Relevant Rules: ORS 469.300(23) and ORS 469.525)

Is making this dramatic departure from the current rules under consideration? The 1978 Attorney General's Opinion stated that, "5. The rule must define the material, not how it is disposed; that is, the definition cannot be written such that the material changes from radioactive to non-radioactive by placing a fence around it, covering it with dirt, or moving it from one place to another." Current ODOE staff appear to have made it clear that this interpretation is still applicable.

Since suggestions for switching to waste management techniques have come up relatively frequently during RAC meetings, I will state now that, if there is a way within the law to do so, we should not go in that direction. Doing what is easier, more cost-effective for industry, etc., now in hopes that negative consequences in the future may not occur threatens the current and future public, as well as landfill personnel. In my view, it also appears to depart from the ORS 469.300(23)(b)(A) in its sole criteria for exemption from the ORS 469.525 ban on disposal materials determined to be safe for public health and safety. Emphasizing the importance of that, ODOE staff has reiterated the fact that, under Oregon law, exemption rules will be applied to materials that will NOT necessarily be disposed of in a landfill, rather they will be classed as NOT radioactive waste at all and can therefore be disposed of anywhere by anyone.

Minimum landfill design should be considered in risk-assessments referenced in Number 8.

DEQ defers to ODOE and DOJ on whether this is allowable under current statute.

As described previously it is imperative that the ultimate disposal location of exempt materials is explicitly considered. The requirements for meeting a pathway exemption must be designed to provide reasonable assurance to the public including disposal workers that they are protected when coming in contact or working around NORM-bearing materials. Risk-based analysis of waste specific doses for appropriate exposure pathways including indoor radon must be accounted for. A thorough analysis must include the waste concentrations, waste forms, facility design, geological conditions, environmental conditions, multiple exposure scenarios, and plausible exposure pathways.

Solid waste permitting for a landfill in Oregon requires a final cap at the time of closure, consideration of this and other site-specific features and protections should be included in the pathway exemption process

Yes, the ultimate disposal location of exempt materials should be explicitly considered. Currently, material can be exempt regardless of ultimate disposal location. A detailed discussion follows. The pathway exemption process should be considered of where waste is being disposed. Oregon law is explicit in stating that the disposal of radioactive material is prohibited in the state of Oregon (OAR 345-050-0006). To regulate waste containing lowlevel amounts of naturally occurring radioactive materials (NORM) and technically enhanced naturally occurring radioactive materials (TENORM), Oregon uses a twopronged approach to determine if the material is "non-radioactive waste" and therefore safe for disposal in Oregon. The first type of exemption essentially declares material exempt from licensing, cleanup requirements, and disposal restrictions based on the material's measurable source content. These exemptions are listed in OAR 345-050-0020, OAR 345-050-0025, and OAR 345-050-0030. If not, the second type of exemption, or pathway exemption, may be sought. The requirements for meeting a pathway exemption are outlined in OAR 345-050-0035 and are designed to provide reasonable assurance that members of the public are protected when coming in contact with the radioactive materials. Disposal of radioactive waste at waste disposal facilities is regulated through 10 CFR 61. The performance objectives in 10 CFR 61.40 state that "land disposal facilities must be sited, designed, operated, closed, and controlled after closure so that reasonable assurance exists that exposures to humans are within the limits established in the performance objectives in §§ 61.41 through 61.44." Oregon clearly prohibits radioactive disposal sites in the state, however, through the pathway exemption process, they do allow for the disposal in Oregon of wastes containing naturally occurring radioactive materials (e.g., NORM/TENORM) that are not explicitly exempt under OAR 345-050-0020, OAR 345-050-0025, and OAR 345-050-0030. Wastes that require a pathway exemption are subjected to a similar performance objective process as 10 CFR 61.40 for radioactive waste facilities. Waste specific doses from inhalation, external gamma exposure, direct consumption of liquid effluents, and indoor radon must be shown to be in compliance with radiation protection guides (RPG). Meeting performance objectives within 10 CFR 61.40 requires a thorough performance assessment that takes into account the waste concentrations, waste forms, facility design, geological conditions, environmental conditions, multiple exposure scenarios, all plausible exposure pathways, etc. Obviously, the components in the respective waste streams are quite different, but the two processes and structure for demonstrating

Staff agrees with the interpretation of Ms. Weathers that Oregon statute and DOJ interpretation precludes the possibility to account for land cover in the determination whether a waste constitutes "radioactive waste" under Oregon law. Because the allowable dose standard has changed, and disposal in a landfill may not be assumed, reduction of the basis for pathway exemption to 100 mrem/yr or lower will effectively render the pathway exemption framework no longer applicable to most if not all wastes that currently have exemptions. This will have material effects to NORM generators that have until now been legally disposing of wastes in landfills in a manner that is not a danger to public health and safety.

					<p>compliance are quite similar with the main differences being that 10 CFR 61 is site specific and takes facility design into account.</p> <p>To the extent that the Department proposes to revise the pathway exemption framework to add complexity, include additional points of compliance or incorporate more restrictive RPGs into OAR 345-050-0035, those proposals should be infused with realism and specificity in the models used to demonstrate compliance. If the licensing of a landfill in Oregon requires a cover at the time of closure, or any other type of safeguard to ensure members of the public or the environmental are protected, these site-specific features should be considered in the pathway exemption process.</p>	
--	--	--	--	--	--	--

Commented [BJ*O22]: Because it is explicitly a radioactive waste disposal facility licensed by the NRC or an agreement state.

<p>Under the current pathway exemption, the average annual NORM/TENORM waste from a facility can be considered. Is this an appropriate evaluation period for pathway exemption determinations? Is any f...</p>	<p>I'm not sure I understand the question and I may have missed any discussion of this during RAC meetings. To what kind of facility does it refer? A generator of waste or disposal facility? If the former, how is it measured and how well is it monitored? If the latter, how is the measure applied for materials disposed of outside of a landfill?</p>	<p>Since NORM/TENORM waste streams contain long-lived radionuclides, the risk-assessments and software discussed in number 8 should be run for a significant time after disposal, e.g. 100 or 1,000 years. RESRAD provides for the assessment of risk over thousands of years post placement of waste.</p>	<p>DEQ defers to ODOE and other experts on this question.</p>	<p>We agree that averaging a facilities various waste streams based on each waste's mass and concentration is appropriate for the pathway exemption framework, as the averaged facility's waste stream is representative of the actual waste stream as disposed. The rules need to be clarified to reflect the averaging of all solid wastes a facility produces or only the NORM-bearing wastes. Further, the annual average waste stream should be representative of the actual waste stream as disposed.</p>	<p>An annual average is appropriate for the pathway exemption framework. Note, however, that the current pathway exemption rules apply to the annual average waste stream, not specifically to the annual average of NORM/TENORM-bearing materials only. The updated rules should preserve this approach to evaluating average annual average waste streams as it would not make policy sense to only evaluate the portions of the waste streams that may contain radioactive material. Further, the annual average waste stream should be representative of the actual waste stream as disposed. Details below. The use of annual average concentrations is supported by the assumed modeling that supported the derivation of the Table 3 effluent values in OAR 345-050-0035. The Oregon Table 3 effluent limits are analogous to the Table 2 annual average effluent limits in Appendix B of 10 CFR 20 (see question 2). These effluent concentrations are equivalent to the radionuclide concentrations which, if inhaled or ingested continuously over the course of a year, would produce a total effective dose equivalent (TEDE) of 50 mrem. And per 10 CFR 20.1302(b)(2)(i) these Table 2 limits are to be compared to the annual average concentrations released in gaseous and liquid effluents at the boundary of the unrestricted area.</p>	<p>If we default to 5 pCi/g, would we still allow waste averaging from a facility? Would we maintain that only NORM-bearing waste may be blended together? Does that concept still work with a standard so low? Would we qualify a waste as "NORM bearing" if it contained 2 pCi/g? Can this be reliably distinguished from non-NORM wastes?</p> <p>Would we average in a rolloff box?</p> <p>Would we find it acceptable to average the entirety of waste accepted in a landfill? In a way, this is what the Argonne study did. It said the "landfill average" could be 13 pCi/g to achieve 100 mrem/yr, then assumed the landfill was 10% full of TENORM spread homogenously, resulting in a concentration limit of 130 pCi/g for individual wastes. (https://deq.nd.gov/Tenorm/ArgonneStudy/ANL-NDDH%20TENORM%20Landfill%20Study%20(ANL%20EVS-14_13)%20Final%20Report.pdf).</p> <p>If we go with the Argonne route and assume 5 pCi/g average in an entire landfill (equivalent to ~38 mrem/yr in a residential scenario), 10% full of TENORM waste, the allowable concentration is . . . 50 pCi/g. This assumes 2m of land cover though, crucially.</p> <p>Again we run into the statutory limitation. Landfills are safety tools of society in a way, so long as the land is available for unrestricted use from a rad perspective based on all reasonably foreseeable future site uses once institutional control is lost.</p>
--	---	--	---	---	---	---

Commented [BJ*O23]: Note to consider whether the rule should include certification and monitoring requirements.

Should changes to the rule be considered to account for potential long-term accumulation of pathway-exempt NORM/TENORM in landfills? (Relevant Rules: OAR 345-050-0035 through 0038)

Absolutely. Cumulative impacts from NORM and TENORM production and disposal appear to me to be among the most important issues on the table as Division 50 rules are under consideration. Unless I'm missing something, while Oregon's overall approach is superior to other states, it still appears that all of the current rules evaluate waste to determine whether it's exempt from the ban or not apply only to individual quantities at the time of evaluation, without regard to potential impact on the public health and safety stemming from the accumulation of similarly exempted waste over time. What this seems to mean, is that Oregon's overall waste disposal regulatory construct, by allowing for exemptions of radioactive material that remain dangerous for hundreds/thousands of years simply fails the test of "no significant danger to the public health and safety" by any definition of "significant" may be accepted as carrying out the intent of the Legislature to protect the public. (See also answer to Q#5 above.)

RESRAD accounts for the buildup and the decay of radionuclides overtime. See number 8.

DEQ is unclear about the potential risk(s) and additional monitoring/actions needed to address the implied risk(s) in this question.

We do not believe this is necessary as landfills are constantly being filled with other non-NORM-bearing wastes, typically at a rate much greater than the acceptance of the NORM-bearing wastes.

The current models for radon and external gamma already account for accumulation. The water pathway model is already extremely conservative and does not warrant the need for long-term accumulation assessments. See below for more details. OAR 345-050-0035
The model used to determine indoor radon concentration currently assumes that the Ra-226 source material is infinitely present at its measured concentration. This is effectively saying that the long-term accumulation at the disposal site will continue with this waste stream until at capacity. The model then computes the resulting indoor radon concentration based on this assumption. The radon emanation of waste streams can vary considerably creating a situation where one waste stream is permitted to have a higher Ra-226 concentration than another stream given its lower radon emanation. Despite this varying degree of Ra-226 concentrations, the resulting indoor radon concentration will always be less than the limit given the assumption of an infinite source for each waste stream. Long-term accumulation is irrelevant since it is assumed in the calculation of the limit. OAR 345-050-0036
The same concept of an "infinite" source is applied to the external gamma exposure. A home is assumed to be built on a semi-infinite plane of a given waste stream (i.e., directly on top of the disposal site). Based on this assumption, further accumulation of NORM/TENORM is not possible. If the model assumed the house was built on a diluted amount of NORM/TENORM (i.e., void space is filled with native soils, not TENORM) and the amount of dilution was dependent on the long-term accumulation of waste (i.e., total inventory/volume at time of closure), then the rule should account for such accumulation. OAR 345-050-0038
The water pathway exemption rule in OAR 345-050-0038 is written for the release of effluents to water and uses the annual average effluent concentrations produced by NORM wastes. The Oregon Table 3 effluent limits are analogous to the Table 2 annual average effluent limits in Appendix B of 10 CFR 20 (see question 2). These effluent concentrations are equivalent to the radionuclide concentrations which, if inhaled or ingested continuously over the course of a year, would produce a total effective dose equivalent (TEDE) of 50 mrem. Direct consumption of the effluent originating 100% from NORM/TENORM waste is ultra conservative and highly unlikely. The use of Table 3 limits for the pathway exemption process does not take into account the presence of non-NORM waste and assumes that the drinkable leachate originates from a disposal site filled with the NORM/TENORM waste in question. Long-term accumulation should only be considered if the underlying models and assumptions are

See response to #5 regarding cumulative impacts. Staff agrees with the points made by OBI and WM that accumulation is presently accounted for in the existing pathway exemption ruleset.

The Table 3 values were originally based on the 10 CFR 30.70 exempt concentration limits for occupational exposure, with a 10x factor to make them equivalent to 500 mrem/yr. A notable exception is Ra-226, which is currently in Table 3 at a concentration equivalent to a 25 mrem/yr dose per the 10 CFR 20 method.

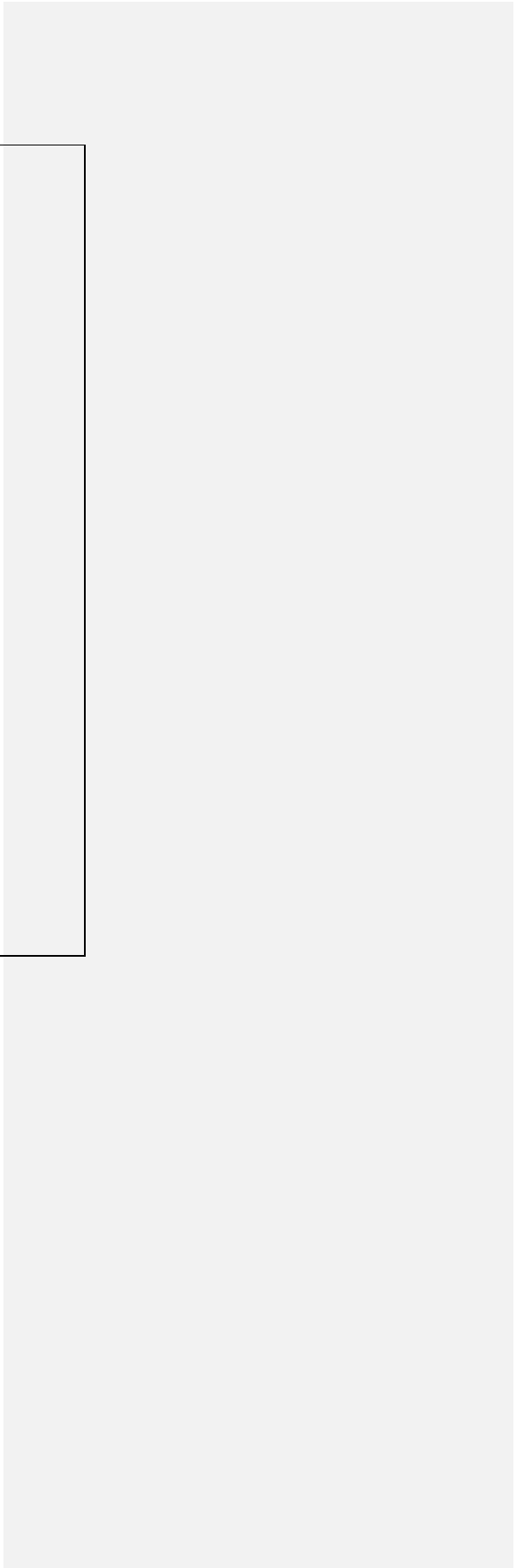
Staff recommend revising Table 3 as necessary to ensure consistency with 10 CFR 20 Appendix B, but transform the values to be consistent with a 100 mrem/yr equivalent expressed in pCi/L for ease of review. The table could be split between NORM and non-NORM nuclides for further ease of reference, consistent with RAC feedback.

Commented [BJ*O24]: See benchmarking of the rule using RESRAD performed at time of rule adoption.

Commented [BJ*O25]: True.

--	--	--	--	--	--	--

revisited and re-evaluated with
less conservatism and more realism.



Are there additional waste forms or types that warrant a specific exemption under OAR 345-050-0030? If so, please list the waste and describe the basis for the proposal in as much detail as possible...

I was not able to attend the first two meetings of the RAC, but I see from the video that the group was asked to name items that could be considered in addition to those already in the cited rule. Presumably, if items are known to contain measurable levels of radioactivity and there is interest in disposing of them within the state, some type of safe level would need to be set, below which a quantity of that material would be exempt from the ban/defined as not radioactive waste and could be stored anywhere by anyone. Is that correct? Again, I struggle with the issue of expanding the field of waste that is actually radioactive by additional exemptions. One concern is cumulative impacts. Additionally, discussion reference to the approach of other states—if what is meant is levels defined as “safe” for disposal—seems inappropriate. I’m unsure how what other states are classing as “safe” can apply here. Is it not true that various states have demonstrated that they are comfortable with accepting even significantly higher levels of radioactivity than would comply with the public health and safety requirement (no significant danger) in general? Also, other states set their acceptable disposal levels under assumptions of waste management such as burial and capping, automatically making their levels higher than ours could ever safely be.

To the main point of identifying and adding new items to exempt, I can only believe **caution is essential**. I don’t believe I have adequate information about where this line of discussion is going—RAC #2 appears to have been somewhat of a brain-storming session. But did the AG’s opinion (1978) determine somehow that the Council was free to develop exemptions **on the basis of convenience** due to circumstances or situations that existed at the time of rulemaking? If that’s the case, fast-forwarding to the task at hand now, how cautious do we need to be with regard to add-ons to OAR 345-050-0030 due to product development during the intervening years? Acknowledging that certain industries and businesses do face economic challenges, it seems to me that OAR 345-050-300 as amended by SB 246 does not change the fact that the Legislature is placing a burden on the Council to focus solely in its exemptions to the ban in ORS 469.525 on the public’s health and safety.

This section, as written, contains at least two obvious conflicts. Not sure of how it is implemented, i.e. **if you meet any one of the exemptions is your waste accepted?** Or do you have to meet all that may apply? Not sure how compliance with this section is demonstrated.

I don’t recommend any additions.

DEQ defers to ODOE and other experts on this question.

We would support specific exclusions for the following materials:

- Zircon sand bearing wastes, i.e., sanding belts, grinding disks,
- Ceramic and zircon containing dental amalgams
- Industrial sandblast grits
- Reagent materials specifically used for treatment of wastes
- Bentonite clay materials

The specific exemptions for Ra-226 and Ra-228 should be re-examined, for example, the Ra-226 limit in OAR 345-050-0030(2) likely originates from EPAs 40 CFR 192.12 limit of 5 pCi g-1. This limit is likely based on uranium mill tailings radon-emanation coefficients, solubilities, and other tailing specific characteristics. The chemical and physical forms of the radionuclides in various TENORM waste can greatly influence their environmental mobility and biologic availability. Exposure assessments should consider the effects these different chemical and physical forms have on overall risk.

Similarly, the uranium limits in Table 1 of OAR 345-050-0025 should be re-visited. As with the Ra-226 limit, the uranium is likely based on uranium mill tailings radon-emanation coefficients, solubilities, and other tailing specific characteristics and may not be representative of industrial TENORM.

Uranium-238 accounts for roughly 50% of the activity concentration in natural uranium (with U-234 making up the other 50%). Therefore, if equilibrium is assumed in NORM/TENORM, radium-bearing materials with a Ra-226 concentration of 5 pCi g-1 will have a U-238 concentration of 5 pCi g-1, a U-234 concentration of 5 pCi g-1 and a natural uranium concentration of ~10 pCi g-1. An NRC Technical Position discussing the disposal of natural uranium was published in the Federal Register Vol. 46 No. 205 (page 52061). In that publication, they set the concentration limit for the surface disposal of natural uranium (U-238 plus U-234) at an “acceptably low” concentration of 10 pCi g-1. They provided this concentration in reference to the EPA’s Ra-226 value of 5 pCi g-1 and based on the discussion above. As with the Ra-226 limit, the uranium limits are likely derived from radon-emanation coefficients, solubilities, and bioavailabilities from uranium mill tailings and **may not be representative of industrial TENORM**.

As an additional note, when comparing isotopic analyses of TENORM to Table 1 values, one should account for the presence of U-234 when interpreting analytical results for U-238. In other words, if U-238 concentration is determined to be 7.5 pCi g-1, one should also assume that U-234 is present at roughly 7.5 pCi g-1. Therefore, when applying the sum of ratios (SOR) dictated by Note 2 of Table 1, one would get a SOR of 1.5. The U-238 (and U-234) limit in Table 1 is effectively 5 pCi g-1, which again, is consistent with

Yes, in particular zircon sands materials should be reexamined, see details below. The specific exemptions for Ra-226 and Ra-228 should be re-examined as they were likely adapted from regulatory limits that pertained to Ra-226/Ra-228 present in uranium mill tailings. For example, the Ra-226 limit in OAR 345-050-0030(2) likely originates from EPAs 40 CFR 192.12 limit of 5 pCi g-1. However, the EPAs limit is based on radon-emanation coefficients, solubilities, and bioavailabilities from uranium mill tailings. The chemical and physical forms of radionuclides in TENORM can greatly influence their environmental mobility and biologic availability. For example, leaching of radionuclides from zircons is quite low in comparison to radium and other radionuclides in uranium mill tailings. **Whereas uranium-mill tailings tend to have radon-emanation coefficients of about 10-40%, the values for zircons tend to be less than 5%**. Exposure assessments for TENORM should consider these factors. As such, any limit that has been adapted from regulations originally created for a specific source of radioactive material (such as the OAR 345-050-0030(2) 5 pCi g-1 Ra-226 limit) should be revisited. Similarly, the uranium limits in Table 1 of OAR 345-050-0025 should be re-visited.

Staff would support a concept by which a specific waste could be exempted following a substantial amount of supporting data (e.g., three successive years of laboratory data or pathway testing showing the wastes consistently meet exemption criteria). Such generic material-specific determinations could be made at staff discretion outside the scope of the rulemaking and documented as they are granted.

At present, no additional waste forms or types have sufficient supporting data, but some such as the reagents with multiple years of profile data and wastewater treatment plant grit wastes may in the near future qualify.

Regarding survey responses about radon emanation from different uranium-bearing wastes such as zircon sands, staff concurs that such wastes likely produce less radon (assuming the waste is not in a weathered state), but the proposed revisions to the pathway exemption standards would make gamma emission and plant uptake significant contributors to total dose. Therefore, the expected lesser radon emanation of zircon sands alone do not qualify these materials for a generic exemption.

Regarding the comment about U-234 and U-235 values in Table 1 of the rule, Note 1 indicates that the limit for the parent isotope (e.g., U-238) takes into account the daughters (U-234). The SOF method in Note 2 would not apply to a NORM chain of parents and daughters. Additional clarification can be added to the Table 1 footnotes to specify the applicability of the SOF approach.

Commented [BJ*O26]: Ah, so he is saying that 5 pCi/g may not always equal 100 mrem/yr depending on radon emanation of zircon or different gamma rates based on density, etc. In this case, retaining a 100 mrem/yr pathway exemption might still make sense, but I’m not sure if it’d practically affect the present pathways and their viability.

For example, if they are saying that the 500 mrem equivalent for SSBO is 55 uR/hr in a rolloff, then the 100 mrem equivalent is still around 11. This could be for wastes as high as 8 pCi/g I think based on the old OSU study, but it’s a little murky without more empirical data to back it up.

Commented [BJ*O27]: I want to hear more on this. What is being proposed specifically? How would such a reevaluation occur?

Commented [BJ*O28]: What specific exemption then would be appropriate as a screening value for “obviously not radioactive”? It seems this is reasonable to keep since it is based on a conservative waste relative to “industrial TENORM” as they define it (to say nothing of fracking tenorm).

--	--	--	--	--	--	--

the Ra-226 limit when equilibrium assumptions are assumed.

Commented [SO29]: flagged for followup

Should any changes to the rule be considered to change or clarify how out-of-equilibrium NORM wastes (i.e., decay products without parents) are addressed? Note: Footnote 1 of Table 1 in OAR 345 Di...

I don't feel qualified to comment.

RESRAD accounts for the buildup and the decay of radionuclides overtime. See number 8.

DEQ defers to ODOE and other experts on this question, and recommends that any changes to current rule ensure clear compliance points.

We recommend that Table 1 values for uranium decay products be expressly limited to natural uranium (U-238, U-234, and U-235); natural thorium (Th-228 and progeny to Ra-228, Th-232); and radium (Ra-226 and progeny, Ra-228).

Pb-210 is a low energy beta-gamma emitter and as a result is difficult to measure by gamma spectroscopy. Based on the fact Pb-210 is a low energy beta-gamma emitter the risks from external exposure are negligible. Lead-210 should not be included or should have a significantly higher Table 1 value than that currently assumed (e.g., 10 pCi/g).

The assumption of equilibrium for the U-238 decay chain should be assumed until the isotopic data indicates otherwise. We recommend the use of the current pathway exemption strategy which contemplates situations where secular equilibrium cannot be assumed. Defining this approach within the Oregon regulatory structure would be advantageous and could help eliminate confusion in the future.

Yes, in particular zircon sands materials should be reexamined, see details below. The specific exemptions for Ra-226 and Ra-228 should be re-examined as they were likely adapted from regulatory limits that pertained to Ra-226/Ra-228 present in uranium mill tailings. For example, the Ra-226 limit in OAR 345-050-0030(2) likely originates from EPA's 40 CFR 192.12 limit of 5 pCi g-1. However, the EPA's limit is based on radon-emanation coefficients, solubilities, and bioavailabilities from uranium mill tailings. The chemical and physical forms of radionuclides in TENORM can greatly influence their environmental mobility and biologic availability. For example, leaching of radionuclides from zircons is quite low in comparison to radium and other radionuclides in uranium mill tailings. Whereas uranium-mill tailings tend to have radon-emanation coefficients of about 10-40%, the values for zircons tend to be less than 5%. Exposure assessments for TENORM should consider these factors. As such, any limit that has been adapted from regulations originally created for a specific source of radioactive material (such as the OAR 345-050-0030(2) 5 pCi g-1 Ra-226 limit) should be revisited. Similarly, the uranium limits in Table 1 of OAR 345-050-0025 should be re-visited. Uranium-238 accounts for roughly 50% of the activity concentration in natural uranium (with U-234 making up the other 50%). Therefore, if equilibrium is assumed in NORM/TENORM, radium-bearing materials with a Ra-226 concentration of 5 pCi g-1 will have a U-238 concentration of 5 pCi g-1, a U-234 concentration of 5 pCi g-1 and a natural uranium concentration of ~10 pCi g-1. An NRC Technical Position discussing the disposal of natural uranium was published in the Federal Registrar Vol. 46 No. 205 (page 52061). In that publication, they set the concentration limit for the surface disposal of natural uranium (U-238 plus U-234) at an "acceptably low" concentration of 10 pCi g-1. They provided this concentration in reference to the EPA's Ra-226 value of 5 pCi g-1 and based on the discussion above. As with the Ra-226 limit, the uranium limits are likely derived from radon-emanation coefficients, solubilities, and bioavailabilities from uranium mill tailings and may not be representative of industrial TENORM. As an additional note, when comparing isotopic analyses of TENORM to Table 1 values, one should account for the presence of U-234 when interpreting analytical results for U-238. In other words, if U-238 concentration is determined to be 7.5 pCi g-1, one should also assume that U-234 is present at roughly 7.5 pCi g-1. Therefore, when applying the sum of ratios (SOR) dictated by Note 2 of Table 1, one would get a SOR of 1.5. The U-238 (and U-234) limit in Table 1 is effectively 5 pCi g-1, which again, is consistent with

It is a standard of practice in current pathway exemptions that when a waste contains only Pb-210 absent parents, the Department only requires the applicant to perform the leachability test (because the lead does not emit gamma or radon).

Note to consider: Dial down the U-238 and U-234 concentrations in Table 1 to 5 pCi/g each maintain equilibrium assumptions with Ra-226 and account for the fact that U-238 includes a contribution from U-234 also, per the survey comment.

Another option: Include a mass-based standard for natural uranium to correspond to 10 pCi/g natural uranium.

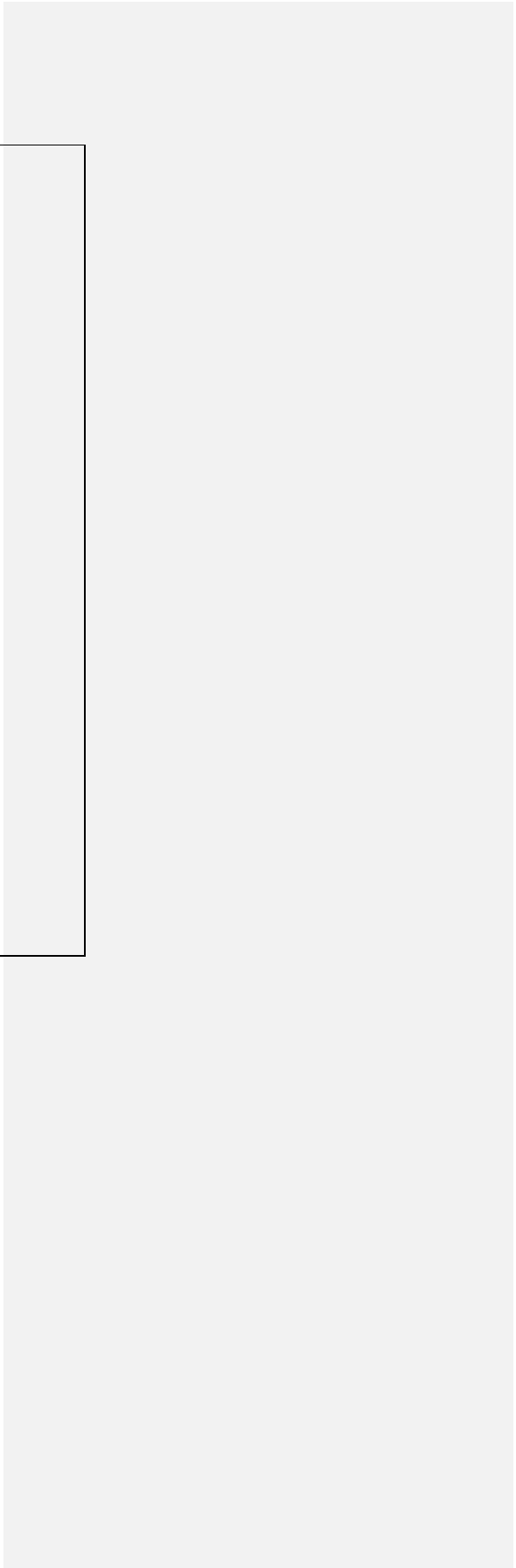
Add a Table 1 value for Th-232? 20 pCi/g consistent with the Ra-228 exemption value?

Commented [S030]: might check concurrence requests here. <5% have detection issues?

Commented [BJ*O31]: Agreed, but we are seeing leachability in the lead that is surprising. One was at 50% of limit for lead with 15 pCi/g, for reference sake.

--	--	--	--	--	--	--

the Ra-226 limit when equilibrium assumptions are assumed.



<p>Are there circumstances when waste blending (i.e., mixing NORM-bearing wastes with non-NORM-bearing wastes for purposes of waste determination) should be allowed? (Relevant Rules: OAR 345-050-0035)</p>	<p>It seems to me that this would amount to opening the door to strategic packaging/transport for purposes of manipulation of readings for individual loads.</p>	<p>As realistic inputs as possible should be used when performing risk assessments.</p>	<p>DEQ defers to ODOE and other experts on this question.</p>	<p>There are situations where mixed wastes are generated at a facility that contain both NORM-bearing wastes and industrial wastes. These potential mixtures of waste represent the whole of the volume being disposed at the facility. Including the mixture of these wastes aligns with the actual exposure risk of what and how materials are deposited in the landfill.</p>	<p>There are situations where waste blending makes sense from an environmental and human health perspective. The response to question 8 addresses our concerns to the extent the Department does not consider averaging of data (whether over time or over the entire waste stream being managed). Similar concerns apply where prohibiting waste blending can, in some circumstances, create an unrealistic and overly restrictive waste management scenario. Although there may be circumstances in which waste blending should not be allowed, blending should be permitted (i) when the non-NORM bearing waste has similar physical and geochemical properties as the NORM-bearing wastes, or (ii) when the NORM and non-NORM bearing materials comprise a single waste stream, as managed for disposal; such as when the non-NORM material is mixed with NORM material at the facility and then the mixture is disposed of in the mixed form (e.g., the annual average waste stream noted in #12). For example, if zircon sands are blended with a similar sand that does not contain elevated NORM and will behave similarly in terms of environmental fate and transport, then blending of this nature should be permitted.</p>	<p>Note to self to review the supreme court case re: Rossman's Landfill and PCC (box in the office in my cube)</p>
--	--	---	---	--	--	--

Should changes to the rule be considered in order to evaluate protection of waste disposal workers?

I'm unclear about this question. Whatever thresholds are put in place need to be consistent with Oregon's law that seeks to be protective of the public at large, regardless of where the waste is disposed of. Waste disposal workers should be safe to work around any waste that meets that criterion.

[ODOE Note: The purpose of this question is to address whether the risk to waste handlers at landfills or transportation workers face a higher risk than the risk to future residents from disposal, such that the pathway exemption value should be adjusted to account for the most sensitive receptor both during and after the disposal. For example, the North Dakota limit was dialed down to 50 pCi/g from 130 pCi/g to account for a limiting dose to workers.]

Worker exposure assessments should be considered. Historically the results are very low due to the low exposure times and relatively low activity concentrations of waste.

DEQ recommends consideration of Senate Concurrent Resolution 17 (2021 legislature) <https://olis.oregonlegislature.gov/liz/2021R1/Downloads/MeasureDocument/SCR17>

No changes to the current rules would be needed as the current rules set more restrictive exposure limits than those applicable to a worker scenario.

No changes to the current rules are needed to evaluate worker protection. If the State of Oregon is adequately protecting the public with the conservative assumptions used in the current pathway exemptions process (i.e., they build a house directly on top of exposed waste), then workers, who are permitted to receive a higher occupational dose (5,000 mrem yr⁻¹), would be adequately protected.

Based on the other revisions to rule, staff concurs that no additional measures are needed for worker safety.

Commented [S032]: this is EJ legislation-a standard for workers that is less restrictive than that for the public could adversely impact communities immediately adjacent to the disposal facility, which is good to keep in mind.

Commented [BJ*O33R32]: Interesting concept. I think the rationale has been that occupational dose is voluntary for pay, so there is benefit alongside risk. This assumes the worker has alternative options for employment and that the work opportunity is itself not built on structural inequity.

Commented [BJ*O34]: This is for rad workers, not disposal workers.

What kind and frequency of verification/certification should be required for pathway exemptions?

I don't recall this matter being discussed.

If the framework described in numbers 4, 5 and 8 is adopted this would not be necessary.

DEQ would like to discuss this question with ODOE.

Gamma scan data on containers of waste sent for disposal should be supplied annually by generators to certify that the exempted wastes are still in compliance. The pathway itself should be re-evaluated if significant changes to the waste stream(s) occur or if any new information about the accepted waste that could alter its acceptance under the existing pathway exemption is found. In the event that TENORM processes change or conditions of accepted TENORM waste change, the pathway exemption criteria would need to be re-certified.

Gamma scan data should be supplied annually by generators to certify that the exempted wastes are still in compliance. The pathway itself should be re-evaluated if significant changes to the waste stream(s) occur that alter the anticipated NORM concentrations, waste chemical or physical forms, or if any new information about the accepted waste that could alter its acceptance under the existing pathway exemption is found. In the event that NORM/TENORM waste generating processes change or conditions of accepted NORM/TENORM waste change, the pathway exemption criteria would need to be re-certified.

Commented [BJ*O35]: Should this be discussed individually as a topic?

Should there be specific tracking or reporting requirements for in-state exempted NORM disposal or out of state radioactive waste disposal from Oregon generators? If so, please specify.

I'm not sure of the implications of this. Has it been discussed? Might this be intended to allow some kind of check to ensure that waste subjected to exemption testing winds up where it's supposed to? More information needed.

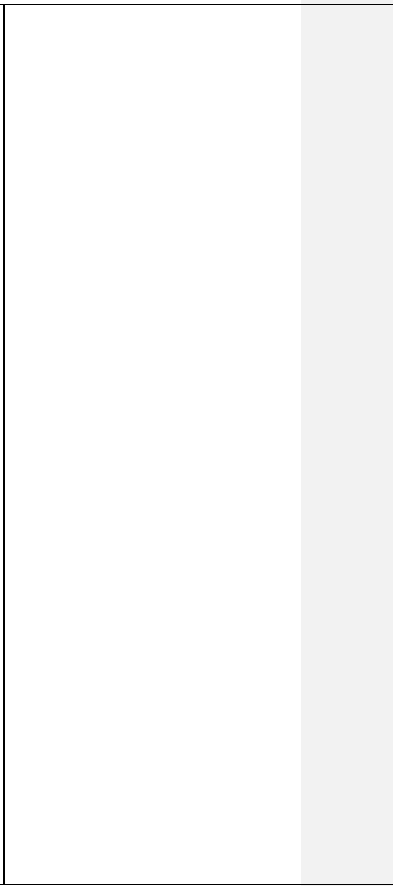
[ODOE Note: If the waste is exempt assuming a semi-infinite plane, then does it matter if we track where it goes?]

There should be tracking but without a mechanism to monitor for radioactivity how does a landfill know if they are accepting NORM?

DEQ defers to ODOE and other experts on this question.

We do not believe separate tracking of waste origination is required, tracking the generation location does not add value to assessing the risk of a particular waste.

No, this only adds to the administrative burden for the generators.



Are there isotopes that should be specifically added to Table 1 of OAR 345 Division 507 (Relevant Rules: OAR 345-050-0025, Table 1)

I don't feel qualified to answer this.

Oregon Table 1 and Table 2 values should mirror those listed in Schedule A of 10 CFR 30.70. Table 1 in OAR 345-050-0025 and 10 CFR 30.70 Schedule A are similar in both radionuclides listed and corresponding limits for by-product materials that are exempt from NRC licensing requirements and not be regulated for disposal under 10 CFR 20.2001. NORM and TENORM are not byproduct materials as defined in 10 CFR 30.4.

DEQ defers to ODOE and other experts on this question.

We suggest that Oregon Table 1 and Table 2 values be aligned with those listed in Schedule A of 10 CFR 30.70. Table 1 in OAR 345-050-0025 and 10 CFR 30.70 Schedule A are similar in both radionuclides listed and corresponding limits for by-product materials that are exempt from NRC licensing requirements and not be regulated for disposal under 10 CFR 20.2001. Because NORM and TENORM are not byproduct materials defined by 10 CFR 30.4, and Table 1 of OAR 345-050-0025 lists naturally occurring radionuclides of uranium (U-234, U235, and U-238), concentration limits for uranium may need to be included in the rule as a separate table or paragraph within OAR.

No additional isotopes need to be in Table 1 at this time. However, it may be helpful to ensure that the radionuclides listed in Table 1 are still consistent with those listed in Schedule A of 10 CFR 30.70 as Schedule A may have changed since Table 1 was developed. Similarly, Table 2 was likely developed from Schedule B of 10 CFR 30.70 and should also be cross-checked for consistency. Table 1 in OAR 345-050-0025 is essentially the same as 10 CFR 30.70 Schedule A in both radionuclides listed and corresponding limits. Schedule A provides concentrations of by-product materials that are exempt from NRC licensing requirements and would therefore not be regulated for disposal under 10 CFR 20.2001. The main difference is that Table 1 of OAR 345-050-0025 lists naturally occurring radionuclides of uranium (U-234, U235, and U-238). However, NORM and TENORM do not fall under the definition of byproduct material as defined in 10 CFR 30.4. It may make more sense to identify the concentration limits for uranium in a separate table or paragraph within OAR. If this were done, the process for how one can address equilibrium can be further defined (see question 15).

Commented [BJ*O36]: @SICILIA Tom * ODOE

Commented [S037]: flagged- table 1a?

<p>Are the existing threshold quantities and concentrations of radium-226 or radium-228 (OAR 345-050-0020 and 0025) appropriate? (Relevant Rules: OAR 345-050-0020 and 0025; Table 1, Table 2)</p>	<p>Again, in terms of protecting the public and since the cumulative impact of radioactivity is such a problem in my view, I've seen no compelling reasons to raise threshold quantities or concentrations currently in place. The intent of the law seems to call for limiting disposal as much as possible—perhaps more protective levels should be considered, although this would likely be difficult to achieve.</p>	<p>If the framework described in numbers 4, 5 and 8 is adopted this would not be necessary.</p>	<p>DEQ defers to ODOE and other experts on this question.</p>	<p>We support the reexamination of the current threshold quantities for Ra-226 and Ra-228, as these were likely derived from regulations originally developed for uranium processing sites.</p> <p>The EPA approach applies limits to the top 15 cm of soils, Oregon applies limits directly to waste concentrations. The EPA approach accounts for dilution from native soils and averaging over a given area, allowing for a more robust and realistic analysis of potential exposure pathways. We believe it is overly conservative to assume that the exposure to a waste's Ra-226 concentration is equivalent to the actual environmental exposure when placed in a modern landfill.</p> <p>We believe the strategy suggested in Question 4 also applies to Ra-226 and Ra-228 limits; the exposure pathways need to be evaluated for both the land application scenario and landfill disposal using a risk-based approach. This risk-based analysis should consider environmental fate and transport properties of the radionuclide in question, taking into account the pertinent environmental setting and realistic receptor exposure scenarios. Any limits that have been adapted from regulations originally developed for a specific source of radioactive material should be revisited to align with the concept of industrial TENORM wastes.</p>	<p>The existing threshold quantities for Ra-226 and Ra-228 should be reexamined, as these were likely derived from regulations originally created for a specific source of radioactive material, e.g., uranium processing sites. Details below.</p> <p>The current Ra-226 concentration is 5 pCi g-1 (OAR 345-050-0030(2)). This value likely comes from the EPAs 40 CFR 192.12 limit of 5 pCi g-1 for residual radioactive materials from inactive uranium processing sites. This limit is based on a TEDE of 100 mrem yr-1 from all exposure pathways for Ra-226. However, the EPA's use of the 5 pCi g-1 limit is different than the State of Oregon's use. The EPA applies this limit to the top 15 cm of soils averaged over 100 m2 whereas Oregon applies it directly to waste concentrations. The EPA is accounting for dilution from native soils and averaging over a given area, allowing for a more robust and realistic analysis of potential exposure pathways. It would be overly conservative to assume that a given waste's Ra-226 concentration were equivalent to the environmental concentration for which a hypothetical receptor would be exposed to externally, grow and consume crops from, etc.</p> <p>The above argument was provided in response to questions 4 (additional pathways). The application of the 5 pCi g-1 limit to waste forms as opposed to soils results in a high level of conservatism where environmental mixing is ignored. Moreover, the EPAs 40 CFR 192.12 limit of 5 pCi g-1 is based on radon-emanation coefficients, solubilities, and bioavailabilities from uranium mill tailings. The chemical and physical forms of radionuclides in TENORM can greatly influence their environmental mobility and biologic availability. For example, leaching of radionuclides from zircons is quite low in comparison to radium and other radionuclides in uranium mill tailings. Whereas uranium mill tailings tend to have radon-emanation coefficients of about 10-40%, the values for zircons tend to be less than 5%. Exposure assessment for TENORM should consider these factors. As such, any limit that has been adapted from regulations originally created for a specific source of radioactive material (such as the OAR 345-050-0030(2) 5 pCi g-1 Ra-226 limit) should be revisited.</p>	<p>Commented [BJ*O38]: What's the practical numerical implication of following this advice if we don't take credit for land cover? Isn't this basically my "RESRAD default" powerpoint slide, turned into the one true new standard? People could still try to use the pathway exemption process, pegged to 100 mrem, if there are wastes that have very low leachability or don't shine as much gamma due to their density, but the difference in allowable concentration I expect would be slight.</p>
--	---	---	---	---	---	---

Should lead-210 receive a specific exemption or be covered under the 10 pCi/g limit for uranium-238 (assuming equilibrium)? (Relevant Rules: OAR 345-050-0025, Table 1)

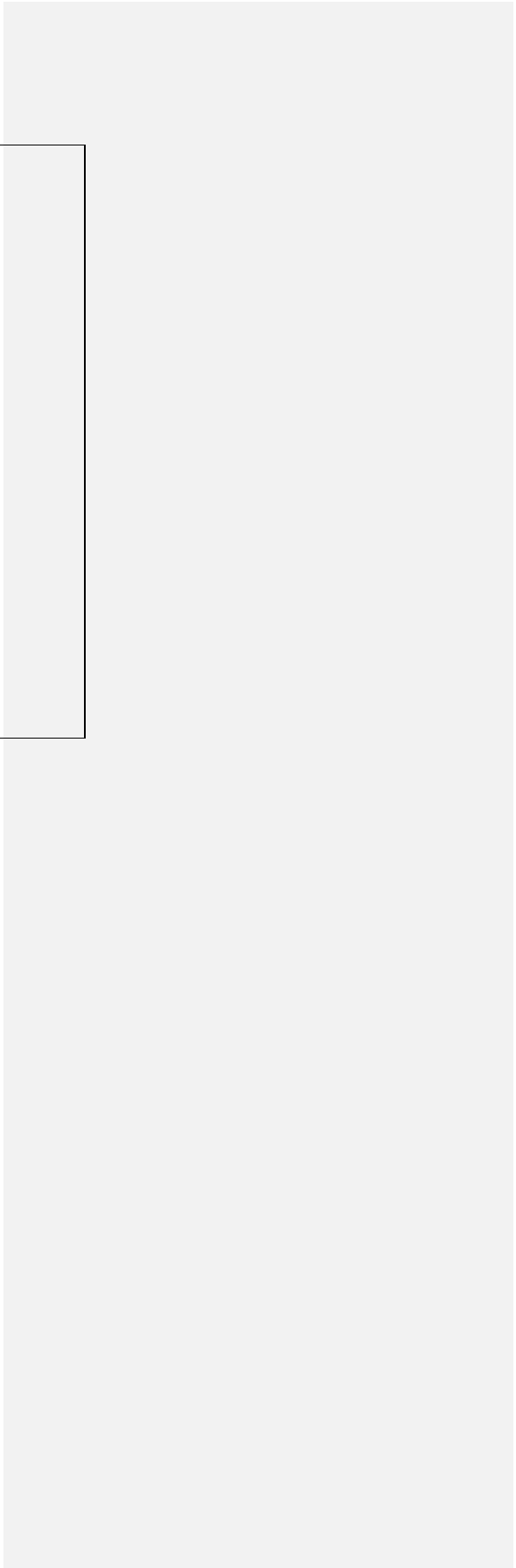
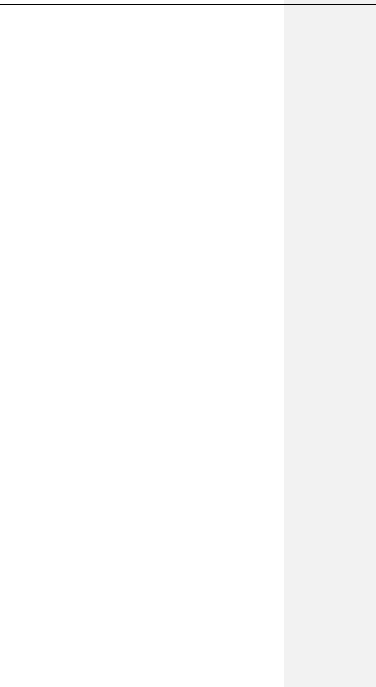
Not qualified to comment beyond my standard priority.

If the framework described in numbers 4, 5 and 8 is adopted this would not be necessary.

DEQ defers to ODOE and other experts on this question.

See question 15 for how Pb-210 can be addressed. The currently applied limit of 10 pCi g-1 is unrealistic and causes frequent issues that are time consuming and costly

See question 15 for how Pb-210 can be covered. The currently applied limit of 10 pCi g-1 is unrealistic and causes frequent issues.



Are any additional standards or rules necessary to prevent disposal of radioactive waste in Oregon, consistent with ORS 469.525 and 469.300 (2021 version)?

Same as all above reference to the issue of accumulation as it relates to public risk. As noted, radioactive waste is generated in-state and it can be anticipated that the lowest-cost disposal structure (via exemptions) is popular and generates the bulk of discussion. However, the long-term, cumulative impact of all that is exempted from the in-state disposal ban must be limited to protect the public, now and in the distant future, both in landfills and outside of them. And we need to remain diligent, including via our rulemaking efforts, to prevent out-of-state interests looking to dispose of momentous quantities of largely fracking waste from being able to utilize our rules to do so here. Is more discussion from the perspective of how these largely highly technical rules under development can be structured to prioritize protection of the public to the greatest extent warranted? I also wonder, after reviewing Jeff's email in response to questions I raised about the Covanta landfill, might there be a need to somehow ensure that all landfills across the state receive the same explicit message about procedures regarding radioactive waste you provided to them? I don't know if it would fit as part of whatever educational process is devised to notify operators of this entire body of Division 50 rules (during comment period and then after they are final). I also don't know if that would be enough, considering that ODOE required Covanta to include specific information in their plan. But it seems that, if Covanta needed to receive the information and be held accountable, all would.

The current rule and the proposed revisions cover a lot of types of radioactivity however there is **no methodology for identifying waste streams and/or monitoring for them**. So the method of compliance is needed.

DEQ would like to discuss this question with ODOE.

We believe the revisions to the rule set adequately protect against disposal of radioactive wastes in Oregon. However, efforts to raise industry (Generator, Transporter, and Disposal) awareness levels must be undertaken. More importantly, development of an established process for review of wastes being disposed in Oregon from a radiation perspective must be accomplished. This waste review process must not create burdensome requirements that cause delays which cripple the generators' ability to dispose of their wastes in a timely manner.

None that we are aware of.

Commented [BJ*O39]: @SICILIA Tom * ODOE

If the pathway exemption process were to no longer be available in Oregon, how would that affect the interests you represent? Can you estimate the cost of sending wastes that would currently be pa...

The League of Women Voters' position on these rules is compliance with the law that calls for protection of the public health and safety. To the extent that the responses of others whose bottom-line considerations call for less protective standards are taken into account in the rules, even though that would simultaneously increase the risk to the public, I expect that the League would be resistant, although my official comments on draft rules will need to be approved by League leadership.

Cost of transportation and disposal of radioactive waste streams, including NORM and TENORM are dependent on the permitted facility, the volume, the required packaging, the type of transportation and the distance. All that considered, out of state disposal of RAM is going to cost **10 to 100 times the cost** of disposal in an Oregon landfill.

If pathway exemptions were eliminated, DEQ believes compliance points for our permittees would be easier to determine.

Our best estimate is the generator's transportation and disposal **costs would likely quadruple** based on the transportation distance differential and other factors. More importantly, current waste **transportation assets are limited** and would not be expected to be able to move the volumes we see out of state in a timely manner. **We support Oregon in developing rules that do not force wastes to other states while simultaneously protecting Oregonians.**

Eliminating the pathway exemption process would **severely negatively impact Oregon businesses without any corresponding environmental or human health benefit.** Oregon businesses would be asked to operate at a severe competitive disadvantage compared to states where NORM/TENORM wastes may be properly managed. Oregon generators report that transporting wastes to out of state radioactive waste disposal sites results in a cost increase of **at least 7 times the in-state disposal costs.** Further, there is an increase in **carbon emissions and transportation risks** from trucking wastes out-of-state unnecessarily.

ODOE concurs that the current disposal of NORM-bearing wastes from generators that possess pathway exemptions, and for which the wastes have been disposed in landfills, are protective of public health and safety standards. This determination of safety, however, does rely on the shielding provided by land cover for wastes disposed in landfills, despite that land cover not being taken into account when the wastes qualified for the pathway exemption. For situations in which wastes are left at the land surface, staff remain concerned that the current gamma dose limit of 500 mrem/yr is not protective in the event of a future resident on site. This results in a policy conundrum whose resolution staff believe lies outside the authority of this rulemaking, if the goal is indeed to both protect Oregonians from involuntary radiation exposure and to prevent negative impacts to Oregon businesses without corresponding environmental or health benefit.

Will any potential rule changes have a fiscal impact, what will the extent of those impacts be, and will there be a significant adverse impact on small businesses?

With all due respect, I don't know how this question can be answered at this point without having a sense of what kinds and extent of changes might be able to be considered. But beyond that, if the answer to this question with regard to any rule change that might be considered were to be "yes," if relaxing or otherwise modifying it to make it more innocuous for small business, but it also stands to increase the potential danger to the public health and safety, should we recommend it to the council as in compliance with the law? Or perhaps this question is included as a conversation starter(?)

ODOE note: This question is intended to understand the industry costs and impacts if the pathway exemption were to not be available and the rule were instead to default to 5 pCi/g. We are trying to understand the effects of such a policy change, which would constitute a significant tightening of the standard in order to bring the gamma dose limit down to current federal limits.]

See number 24.

Rule changes may have an impact.

We have experienced significant fiscal impacts in the management of TENORM-bearing wastes disposed in Oregon. We have been required to add 3 FTEs at one facility, and additional FTEs will be required if current requirements are extended to our other facilities. Third party scientists' oversight and reviews, portal equipment, handheld measurement equipment, emanation chambers, and laboratory analysis costs are significant.

Finally, larger generators will be required to add FTEs to manage disposal of their wastes and the increased costs for laboratory analysis is significant for some generators. Property availability for on-site storage of wastes pending approval is also an important consideration.

The pathway exemption process is already very costly, and the costs of compliance are borne disproportionately by small businesses that may have to manage NORM/TENORM, as there is no scaling of costs.

In practical terms, we approve an exempt concentration (e.g., 20 pCi/g) based on an annual average from the facility, then derive a uR/hr screening value that assumes all waste in the box is at that concentration (e.g., 50 uR/hr). One small area containing 20 pCi/g would appear lower than this screening value due to gamma dilution from the other waste in the box. A hotspot significantly higher than 20 pCi/g might appear to exceed the 50 uR/hr threshold, necessitating additional investigation and reasoning why this box of waste is consistent with the facility's pathway exemption.

If the pathway exemption goes away, then the uR/hr limit for a box would be ~11 uR/hr assuming that whole box contains waste at 5 pCi/g. if any part of the box exceeds 11 uR/hr, then an isolated area of the box clearly contains waste exceeding 5 pCi/g enough to shine through. If we assume a semi-infinite plain containing the contents of this heterogeneous box, then some averaging of screening results may be appropriate **or else we risk declaring a box full of radioactive waste that on average would not exceed 5 pCi/g.**

OTOH, a hot bucket in an otherwise clean load is just the kind of red flag that portals are often intended to catch.

The Rule allows physical mixing of a box to "average out" the waste.

NEED TO MICROSIELD SOME EXAMPLES TO PLAY OUT THESE SCENARIOS WITH HOTSPOTS AND SEE HOW HOT OF A SPOT IT WOULD TAKE IN OTHERWISE CLEAN WASTE TO LOOK LIKE 11 UR/HR.

Attachment 3

Proposed Draft Rule Response Comment Matrix

REVIEW COMMENT RECORD (RCR)	Document(s) Reviewed: OR Radioactive Waste Rulemaking	Page 1 of 5
		Date (Response Due) 08/30/2023

Document(s) Reviewer (Name) Tom Sicilia, Matt Hendrickson, Max Woods	Date (Reviewed) 9/5
--	----------------------------

Item	Commenter	Section	Comments	Comment Resolution
1.	ORRA	n/a	No comments – there may be a cost to implement, but it will be borne by users, and worth it to ensure worker safety	Thank you for the comment
2.	OBI	00xx(5)(d)	Seeing clarification that (d)I and II are not applicable to wastes stored under (a)(b) and (c)	That is correct
3.	OBI	00xx(5)(d)(ii)	ODOE can achieve its regulatory objectives without imposing unnecessary costs or constraints on either the regulated community or the department itself. Specifically, we ask that ODOE revise the draft rule language to enable the department to allow generators of radioactive waste subject to subsection (5)(d)(ii) to temporarily accumulate that waste onsite for up to 180 days without prior written authorization and for up to one year with written authorization from the department.	Staff understands the desire to allow longer than 180 days to dispose of radioactive waste. The proposed language in 00xx(5)(d)(ii) considers the current state of the disposal industry and rectifies an unenforceable and unachievable “7-day rule” in the currently applicable rules. We note that this would only apply if a generator of radioactive waste does not have a license with RPS. If accumulated waste is anticipated to remain onsite for longer than 90 or 180 days, the generator may apply for a license from RPS. At that time, the site would no longer be subject to 00xx(5)(d)(ii). Staff do not believe that unlicensed organizations should hold known radioactive waste for extended periods of time beyond the 90/180 day limits proposed in rule. Considering staff’s knowledge of the process for disposing of radioactive waste, 90/180 days is expected to be sufficient time to coordinate transportation and disposal at an out-of-state facility or to complete an application for an RPS license.
4.	WM	Table 1	Accumulation in aquatic organisms is an interesting piece of information, but it is generally irrelevant to the landfill exposure scenario... Contrary to popular myth, Po-210 is not more radiotoxic than either Ra-226 or Pb-210 on a per unit activity basis. Table A below lists the ingestion, inhalation, and external dose coefficients for Po-210, Pb-210, and Ra-226. As can be seen, Pb-210 has a higher ingestion dose coefficient compared to Po-210 and Ra-226 has a higher inhalation dose coefficient compared to that of Po-210 and Pb-210... For these reasons, we recommend that Table 1 values for uranium decay products be expressly limited to natural uranium (U-238, U-234, and U-235); natural thorium (Th-232); and Ra-226. Separate Table 1 limits are unnecessary for relatively short-lived progeny radionuclides, e.g., Pb-210, Th-228, and Ra-228. By focusing regulatory efforts on materials with higher radiological risks and potential hazards, we can ensure the efficient use of resources while maintaining effective protection of public health and the environment.	Table 1 is not being revised at this time. Lead-210 is included as a specific exemption in certain cases when the waste is enriched in lead-210, which to date have only been identified in wastes from industrial processes in the petroleum refining industry.
5.	WM		Lead-210 (Pb-210) has a 22.2-year half-life, far shorter than that of radium-226 (Ra-226, 1600 years) and uranium-238 (U-238, 4.5 billion	In certain petroleum related wastes, lead-210 can become enriched and out of equilibrium with its parent isotopes, and

REVIEW COMMENT RECORD (RCR)

Document(s) Reviewed:

OR Radioactive Waste Rulemaking

Date (Response Due)

08/30/2023

Item	Commenter	Section	Comments	Comment Resolution
			<p>years) ... More importantly, the ingestion and inhalation pathways from a landfill disposal require environmental transport or loss of control of the landfill...It has been demonstrated by Argonne National Laboratory (ANL 2014), the Norwegian Radiation Protection Authority (NRPA 2010), and by the Pennsylvania Department of Environmental Protection (PA DEP 2016) that Pb-210 by itself is not a significant contributor to dose from TENORM-bearing materials. This is consistent with preliminary RESRAD results presented by ODOE in the December 20, 2021 meeting, which demonstrate that Pb-210 is of limited consequence to dose for the air and water exposure pathways. For these reasons, we recommend that Table 1 values for uranium decay products be expressly limited to natural uranium (U-238, U-234, and U-235); natural thorium (Th-232); and Ra-226. Separate Table 1 limits are unnecessary for relatively short-lived progeny radionuclides, e.g., Pb-210, Th-228, and Ra-228. By focusing regulatory efforts on materials with higher radiological risks and potential hazards, we can ensure the efficient use of resources while maintaining effective protection of public health and the environment.</p>	<p>is a dose-driver in standard exposure models. While 22 years is a more rapid decay rate than other NORM isotopes, it is far longer than any exemptions for medical isotopes or decay in place hold times, which are measured in hours or days. It is understood that the proposed addition of lead-210 is not intended to account for landfill exposure scenarios, but rather farming on land spread wastes. The proposed addition of lead-210 is intended to patch an identified loophole. As you mention, WM has been complying with this agency interpretation since 2019, and staff would like to ensure that all entities in the state are playing on an even field. As an extra step to demonstrate compliance, staff does not see four additional analytical samples for specific petroleum related wastes outside of equilibrium that have lead -210 above 10 pCi/g as an undue burden.</p>
6.	LWVOR	345-050-00xx(2)	<p>I will note that I believe 345-050-0040, per se, would be improved significantly by inserting "that were generated before June 1, 1981" at the end of the first sentence. I believe the current language leaves a seriously wrong impression. Addition of; "but whose removal has been determined to pose a significantly greater threat to the public health and safety than maintaining it in place."</p>	<p>The staff respectfully disagrees to the addition of "but whose removal has been determined to pose a significantly greater threat to the public health and safety than maintaining it in place." The need for 345-050-0040 through 0130 is driven by materials that were in place before the disposal prohibition of June 1, 1981. All items post that date are subject to disposal prohibitions in statute and rule.</p>
7.	LWVOR	00xx(5)(d) 00xx(5)(d)(ii)	<p>First, this segment of the draft is, in my view, a vast improvement and I'm glad to see it. But I have some thoughts. Perhaps minor, I suggest using the term "holding" rather than "storage" throughout because in other parts of the rules and perhaps in general, "storage" may suggest something akin to "disposal" whereas "holding" has more of a "temporary" sense to it. Your call on the semantics. More importantly, I'm suggesting creating a whole new numbered subsection for the "Temporary" issue and placing it after 345-050-0130 (I'd envision it better after 0039, but that would require massive renumbering). I propose this to underscore the uniqueness these materials from all of the other various types of materials dealt with in 345-050, but also their parity in terms of importance. That is, by their characteristics, they indeed "[present] a significant danger to the public health and safety" (as do pre-1981 materials or tailings), but their removal from the state must be dealt with very specifically as a practical matter and safely.</p>	<p>Staff agrees that "holding" does denote a more temporary situation, but the nomenclature choice of store or storage is deliberate. Staff believes this aligns better with other terms used in the industry such as "decay in storage (DIS)" the allowable method of disposal for radioactive materials with a half-life of 120 days or less, and in the hazardous waste field under the federal Resource Conservation and Recovery Act (RCRA), a "treatment, storage, and disposal facility (TSDF)." A potential allowance of using hold or holding can be found in 345-050-0006 as this section uses both hold and storage. The larger question is of "Temporary" waste issues, section 345-050-00xx (5) or -00yy (regarding allowable temporary holding) as Ms. Weathers titles it. Staff agrees that there is a need to address items that may pose a danger to public health and safety but may not be adequately covered under the current rules. The intent with 345-050-0010 or 00XX</p>

REVIEW COMMENT RECORD (RCR)**Document(s) Reviewed:**

OR Radioactive Waste Rulemaking

Page 3 of 5

Date (Response Due)

08/30/2023

Item	Commenter	Section	Comments	Comment Resolution
				(5)(d)(i) through (5)(d)(ii) is to encourage individuals or facilities that were previously unlicensed and discover radioactive materials to either get licensed or dispose of the material in a legitimate, timely manner at an out-of-state landfill that accepts such waste. Staff shares the thought that "...underscore the uniqueness these materials from all of the other various types of materials dealt with in 345-050, but also their parity in terms of importance." The reason behind placing it higher in the rules, in purpose and applicability, is to encourage the proper treatment and disposal of this material and reinforce that disposal is prohibited under all but the most stringent circumstances.
8.	LWVOR	0020 0025 0030	...There could be a simple solution to fix the disjointed situation, but some editing is needed for clarity This is a sentence fragment... but it seems to me that (2) is incomplete. If the intent is to somehow tie it to the explanation in (1), that doesn't appear to have happened. This (4) stands on its own as a sentence, but as I read it, it also lacks a clear connection to, and flow within, 345-050-0020	Accepted: Editorial note on several sections: Staff has edited section (1) to denote a continued clause.
9.	LWVOR	0030	I believe it would strengthen this subsection if reference could be made to authorizing statute. By the way, the organization of this subsection doesn't suffer from the same construction issues noted above. Perhaps it could serve as a model, as it opens with an unnumbered statement and indicates that applicable occasions follow.	See comment 8. Statutory Authority is listed in the footer following this section and in the main 0030.
10.	LWVOR	00xx(5)(d) 00xx(5)(d)(ii) (345-050-00yy LWVOR)	I explained above my reasons for creating this as a separate subsection above in 345-050-00xx, as well as my suggestion to replace "storage" with "hold" or "holding" when speaking of allowable "temporary" action. I'm not wedded to the latter, but I think it might be helpful. Overall, I support how this matter has been handled in terms of describing processes and safety safeguards.	See comment 7
11.	DEQ	00XX(5)	The term "disposal" is used in more than just OAR 345-050-0006. The phrase "these rules" is used in other sections, and might make sense here.	Comment accepted
12.	DEQ	00XX(5)(b)	I was unable to locate a definition of what "temporary storage" means in 469, 453, and Div. 26. It might make sense to define what or where this compliance point is located for sub(a), (b), and (c) of this rule.	Comment accepted

REVIEW COMMENT RECORD (RCR)**Document(s) Reviewed:**

OR Radioactive Waste Rulemaking

Page 4 of 5

Date (Response Due)

08/30/2023

Item	Commenter	Section	Comments	Comment Resolution
13.	DEQ	00XX(5)(b)	Suggest replacing site specific name if possible. Updated name to match rule cited.	There is only one such facility in the state, and it is referenced in the applicable rules as such.
14.	DEQ	00xx(5)(d)(i)	This appears to limit the applicability to just these means of discovery. If desired, you could delete this text to expand the applicability.*	*- comment on prior version - agree
15.	DEQ	00xx(5)(d)(i)	Recommend adding a clear compliance point. At what point would someone not meet the spirit of this rule?*	*- comment on prior version - agree
16.	DEQ	0025(1)	..exceeds 10 - In previous conversations, it was indicated that the tables would be modified to allow for the selection of various units. Does it make sense to provide a unit with this compliance point?	Ten is the maximum number of radionuclides allowed at their maximum activity. It is unitless.
17.	DEQ	0030(6)	<p>What does "location of original disposal" mean? As written, it is unclear if current practices at DEQ permitted landfills would need to change. For example, landfills often have to install gas wells or conduct other activities that require waste to be excavated. The majority of the time, an active landfill, will dispose of the excavated waste at their current active face. It is unclear whether continuing this activity would be considered allowable if there was a concern if the waste contained "wastes legally disposed before ...".</p> <p>Would disposing of the excavated waste at a different DEQ permitted landfill be acceptable? For example, although rare, an extreme weather event could occur that results in the need for a DEQ permitted closed landfill to repair their cap. As part of the repair, waste underlying the damaged area needs to be removed. As the landfill is closed, the excavated waste would typically be hauled to different DEQ permitted landfill. Would this be allowed if there was a concern that the waste included "wastes legally disposed before ..."?</p>	<p>Unless the pathway exemption process changes in the future, the material would be allowable for re-disposal in the state (with some additional data requirements for non-landfilled material). This rule is acknowledging the potential for the pathway exemption to be updated, and not requiring all past pathway-approved waste to be aggressively excavated and re-assessed as part of that process.</p> <p>However, if it is known that pathway exempt waste was historically disposed in a landfill and the standards are updated, and if a new waste-form is generated by an activity disturbing the landfill, it is expected that the waste would be evaluated against the requirements at the time that the disturbance occurs (i.e., the point of waste generation).</p>
18.	DEQ	00xx(5)(a)	Consider adding, "and stored or staged in accordance with a state license."	Comment accepted
19.	DEQ	00xx(5)(d)(i)(B)	"minimizes risk of mobilization" - This clause may be too vague to enforce. Consider something more objective/specific.	Comment accepted
20.	DEQ	0030(3)	No idea if this is relevant or should be considered - pets may be treated with chemotherapy.	Comment accepted

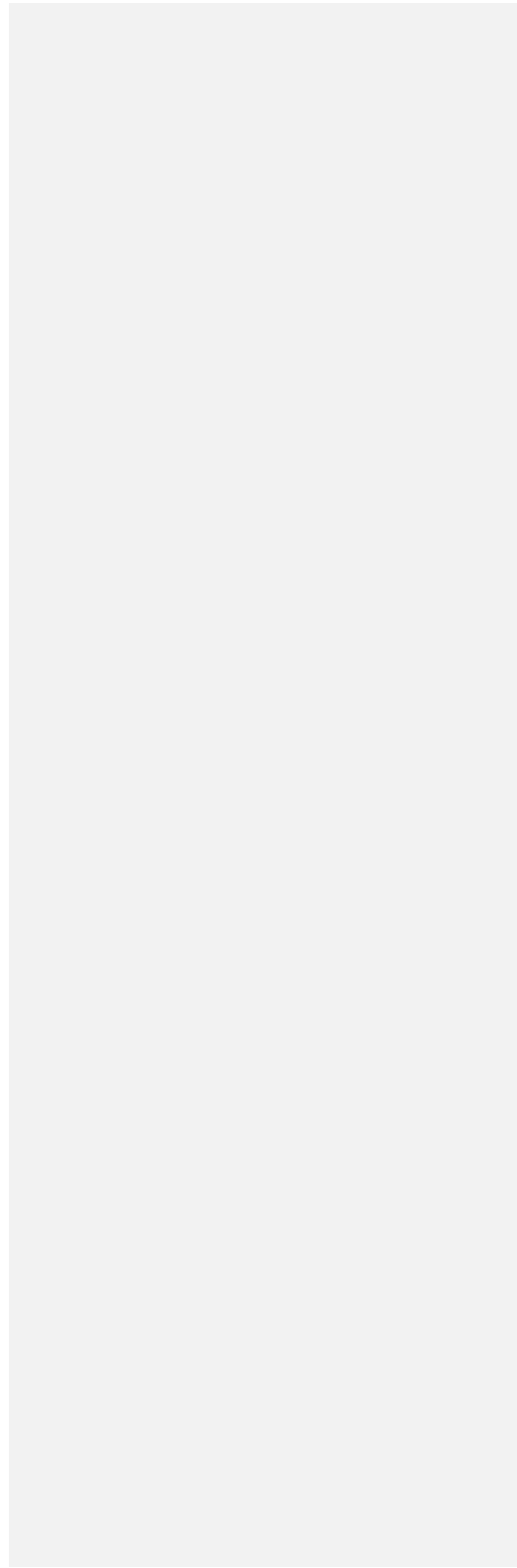
REVIEW COMMENT RECORD (RCR)**Document(s) Reviewed:**

OR Radioactive Waste Rulemaking

Page 5 of 5**Date (Response Due)**

08/30/2023

DEQ Comments On Prior Draft December 2022



DIVISION 50 - RADIOACTIVE WASTE MATERIALS

345-050-0006 - Disposal Prohibited

Except (1) As provided under ORS 469.525, no radioactive waste shall be disposed of within this state, no person may arrange for disposal of radioactive waste within this state, no person may transport radioactive waste for disposal in this state and no waste disposal facility for any radioactive waste shall be established, operated or licensed within this state, except as provided in ORS chapter 469.525 and this division, a person shall not hold or place discarded or unwanted radioactive material for more than seven days at any geographical site in Oregon except:

(2) For the site at which the purposes of this rule, disposal does not include:

(a) Temporary storage of radioactive material was waste used or generated according to a license under ORS 453.635 or a site of a thermal power plant used for the temporary storage of radioactive material from that plant for which the Council issued a site certificate;

(b) Temporary storage of radioactive waste at the Trojan Independent Spent Fuel Storage Installation, subject to the provisions of OAR 345-026-0300 through 345-026-0390

(c) Temporary storage of radioactive waste from a reactor for which a site certificate has been issued pursuant to this chapter that is operated by a college, university or graduate center for research purposes and is not connected to the Northwest Power Grid; and

(d) Temporary storage of other radioactive waste pending lawful disposal out of this state, subject to the following:

(A) Any person that intends to temporarily store radioactive waste must obtain a determination from the Oregon Health Authority that sufficient systems, structures, and processes are in place to ensure the radioactive waste will be safely stored pending lawful disposal;

(B) Temporary storage may not exceed 90 days without prior written authorization from the Department. To grant authorization to temporarily store radioactive waste for more than 90 days, the Department, in consultation with Oregon Health Authority, must determine that the radioactive waste presents no significant risk to public health and safety during storage and will be properly disposed as soon as reasonably achievable.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525

345-050-00XX - Radioactive Waste Determination Process and Schedule

If through process knowledge, radiation screening, or waste characterization data a person discovers that a material is likely radioactive waste, that person must report to the Department and the Oregon Health Authority. The Department may establish an enforceable timeline or other requirements to determine whether the material is radioactive waste.

Commented [CC1]: Note to RAC: Added new language from revised ORS 469.525 and rewrote this rule to follow the same structure as statute

Commented [JJ*D2]: The term "disposal" is used in more than just OAR 345-050-0006. The phrase "these rules" is used in other sections, and might make sense here.

Commented [JJ*D3]: I was unable to locate a definition of what "temporary storage" means in 469, 453, and Div. 26. It might make sense to define what or where this compliance point is located for sub(a), (b), and (c) of this rule.

Commented [JJ*D4]: Suggest replacing site specific name if possible. Updated name to match rule cited.

345-026-0300
Regulations Applicable to the Trojan I

Commented [JJ*D5]: This appears to limit the applicability to just these means of discovery. If desired, you could delete this text to expand the applicability.

Commented [JJ*D6]: Recommend adding a clear compliance point. At what point would someone not meet the spirit of this rule?

345-050-0010 - Purpose and Applicability

(1) Because virtually all materials contain some radioactivity, the purpose of the rules in ~~this division~~ OAR 345-050-0006 through 345-050-0039 is to identify those materials that present such small health hazards that they are ~~exempt from the provisions of ORS 469.525~~ not considered to be radioactive waste and may be disposed of within the state.

(2) ~~The rules in this division~~ OAR 345-050-0040 through 345-050-0130 establish standards for the siting of facilities for disposal of radioactive wastes that were generated before June 1, 1981, through industrial or manufacturing processes and that contain naturally occurring radioactive isotopes. These rules implement the requirements of ORS 469.375, 469.470 and 469.501 to 469.559 for such waste disposal facilities.

(3) Except as provided in OAR 345-050-0060, these rules do not apply to uranium mine overburden or uranium mill tailings, mill wastes or mill by-product material that are subject to OAR chapter 345, divisions 92 and 95.

Statutory/Other Authority: ORS 469.470

Statutes/Other Implemented: ORS 469.525

345-050-0020 - Exempt Quantities

(1) Materials ~~are exempt from provisions of ORS 469.525 if such materials that~~ contain radioactive material radionuclides in individual quantities ~~none of which exceeds that do not exceed~~ the applicable quantity ~~set forth~~ identified in Table 2 and #Table 2a are not radioactive waste for the purposes of ORS 469.525 and these rules unless the number of individual ~~quantities does not exceed radionuclides at~~ their maximum allowable activity given in Table 2 or 2a exceeds 10⁻².

(2) Burial of a human body containing radioactive materials used for diagnostic or therapeutic purposes is exempt from the provisions of ORS 469.525 if the burial is otherwise done in accordance with applicable Oregon law.

~~[ED. NOTE: The Table referenced in this rule is not printed in the OAR Compilation. Copies are available from the agency.]~~

Statutory/Other Authority: ORS 469.470

Statutes/Other Implemented: ORS 469.300 & ORS 97.153

345-050-0025 - Exempt Concentrations

Materials ~~are exempt from the provisions of ORS 469.525 provided that such materials contain~~ radioactive materials radionuclides in concentrations ~~not below the applicable concentration identified~~ in excess of those of Table 1.

Commented [WM*O7]: Please note that rule numbering may change in a final version

Commented [JJ*D8]: In previous conversations, it was indicated that the tables would be modified to allow for the selection of various units. Does it make sense to provide a unit with this compliance point?

~~{ED. NOTE: The and Table referenced in this rule is not printed in 1a are not radioactive waste for the OAR Compilation. Copies are available from the agency.} purposes of ORS 469.525 and these rules.~~

Statutory/Other Authority: ORS 469
Statutes/Other Implemented: ORS 469.300, ORS 469.470 & ORS 469.525

345-050-0030 - Specific Exemptions

In addition to the exemptions under OAR 345-050-0020 and 345-050-0025, the following materials are exempt from the provisions of ~~rule ORS 469.525 and OAR 345-050-0006:~~

(1) Radioactive material, ~~excluding NORM materials,~~ that has been incorporated into a consumer product manufactured under a license issued by the Nuclear Regulatory Commission (NRC) or by an Agreement State, if the NRC or the Agreement State that issued the license has determined that the possession, use, transfer and disposal of such consumer product are exempt from regulatory requirements. An "Agreement State" is a state to which the NRC has delegated its authority to license and regulate byproduct materials (radioisotopes), source materials (uranium and thorium) and certain quantities of special nuclear materials in accordance with section 274b of the Atomic Energy Act.

~~(2) Radium-bearing materials containing less than 5 picocuries of radium-226 per gram of solid, regardless of quantity.~~

~~(3) Radium-bearing material containing a total radium-226 activity of less than 10 microcuries, regardless of concentration.~~

~~(4) Thorium-bearing materials containing less than 20 picocuries of radium-228 per gram of solid, if the radium-228 is present with the parent thorium-232, regardless of quantity.~~

~~(5) Thorium-bearing materials containing a total radium-228 activity of less than 100 microcuries, if the radium-228 is present with the parent thorium-232, regardless of concentration in the solid.~~

~~(6)~~

(2) Medical, industrial and research laboratory wastes contained in small, sealed, discrete containers in which the radioactive material is dissolved or dispersed in an organic solvent or biological fluid for the purpose of liquid scintillation counting and experimental animal carcasses that are disposed of or treated at a hazardous waste disposal facility licensed by the U.S. Environmental Protection Agency (U.S. EPA), by the Oregon Department of Environmental Quality, or by another state delegated the responsibility to regulate the disposal or treatment of hazardous waste by the U.S. EPA.

~~(7) Wastes generated before June 1, 1981, through industrial or manufacturing processes that contain only naturally occurring radioactive isotopes, if such wastes are disposed of at a facility for which the Council has issued a site certificate in accordance with ORS 469.375 and OAR 345-050-0040 through 345-050-0130.~~

~~(8) Maintenance of radioactive coal ash at the site of a thermal power plant for which the Council has issued a site certificate.~~

Commented [JJ*D9]: Throughout these rules, NORM is written as normally occurring radioactive material (NORM). Suggest being consist here.

Commented [WM*O10]: Note for the RAC, these exemptions are proposed to be incorporated into Table 1 and 1a.

Commented [WM*O11]: Note for the RAC: ODOE has worked with PGE to validate that the coal ash pile at the former Boardman Coal Plant is not considered radioactive waste.

(93) Waste that an Oregon Health Authority assessment affirms results from the metabolism of isotopes used in medical treatment which only contain isotopes that will decay to activities below Table 2 limits within XX days. Exemption requires Oregon Health Authority determination as to the waste composition and activity and conclusion that the material presents no significant risk to the public, workers, or the environment.

(34) Wastes containing only naturally occurring radioactive isotopes other than those in the uranium and thorium decay series, as long as the isotopes exist in their naturally occurring isotopic concentrations.

(54) Wastes legally disposed before [DATE OF REVISION] provided the waste is not removed from the location of original disposal.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525

345-050-0035 - Pathway Exemption

Naturally-For the purposes of ORS 469.525 and these rules, the Department may determine that wastes containing naturally occurring radioactive materials (NORM) are exempt from the provisions of OAR 345-050-0006 not radioactive waste if the Council or the Department of Energy finds that accumulation of material the evaluated waste cannot result in cumulative exposures exceeding 500 millirem of 100 millirem per year from external gamma radiation per year, nor in, the annual average release of effluents to air and water in annual average concentrations exceeding the values in Table 3, and uptake of radionuclides into edible plants. Waste-specific analysis may be requested by the Department when non-standard materials are evaluated. The Council or the Department shall must base its finding on an evaluation of potential radiation exposures and effluent releases performed under, and subject to the following conditions:

(1) Documentation submitted to the evaluation considers material Department must evaluate the NORM-bearing waste in the form in which it exists when it is removed from the users' equipment, systems, or settling ponds generated prior to any dilution or remedial action designed to reduce radiation levels. Multiple NORM-bearing waste products generated from a single site may be evaluated based on:

(a) The annual average concentrations of naturally occurring radioisotopes from all NORM-bearing waste being disposed, or

(b) The concentrations of naturally occurring radioisotopes in a container of wastes representative of the cumulative NORM-bearing waste streams generated in a year at the site.

(2) The evaluation does not consider any ameliorating effects of land use restrictions, maintenance operations, or cover material at the disposal site in the evaluation.

Commented [JJ*D12]: What does "location of original disposal" mean? As written, it is unclear if current practices at DEQ permitted landfills would need to change. For example, landfills often have to install gas wells or conduct other activities that require waste to be excavated. The majority of the time, an active landfill, will dispose of the excavated waste at their current active face. It is unclear whether continuing this activity would be considered allowable if there was a concern if the waste contained "wastes legally disposed before ...".

Would disposing of the excavated waste at a different DEQ permitted landfill be acceptable? For example, although rare, an extreme weather event could occur that results in the need for a DEQ permitted closed landfill to repair their cap. As part of the repair, waste underlying the damaged area needs to be removed. As the landfill is closed, the excavated waste would typically be hauled to different DEQ permitted landfill. Would this be allowed if there was a concern that the waste included "wastes legally disposed before ..."?

Commented [WM*O13]: Note for RAC, 100 mrem per year is the NRC recommended annual dose standard for members of the public. However, the NRC does not regulate NORM material.

(3) ~~The evaluation covers-~~Department must evaluate wastes based on the accumulations of ~~material~~ NORM-bearing waste from the site of generation over the reasonably projected period of waste generation, or on an annual basis if the waste is generated via ongoing operations.

(4) ~~The evaluation bases~~Department must estimate external gamma radiation exposures ~~on~~ using actual measurement with allowance for the degree of equilibrium and for self-shielding.

(5) ~~The evaluation uses the following premises in computing~~If the NORM-bearing waste contains radium-226, the Department must estimate radon concentrations in the air above ~~at~~ the disposal site ~~containing radium-226-~~ using the following assumptions:

~~(a) The evaluation assumes that any~~(a) Any house built on ground contaminated with radium-226 has an 8-foot high ceiling on the first floor, has a two-foot high crawlspace, has one complete air change per hour in the house and X air changes per hour in the crawlspace, a vapor barrier attenuation factor of 1.1, and has a foundation constructed so as to meet the **Structural Specialty Code** (State of Oregon Uniform Building Code) in effect on March 1, 1979 without allowance for any special construction or treatments designed to reduce radon diffusion into the structure;

~~(b) The evaluation bases the~~ relation between radon-emanation rate and radium concentration upon experimental measurements on ~~material intended for disposal-~~ a representative sample of the waste.

(6) The evaluation shall follow a sum of fractions approach to determine compliance with the 100 millirem per year dose standard. The sum of fractions approach shall consider the cumulative contributions from all pathways, radionuclides, and waste streams comprising the annual waste.

$$\left(\frac{\text{site average gamma reading}}{100 \frac{\mu\text{R}}{\text{hr}} \text{ equivalent for container geometry}} + \text{water pathway sum of fractions} + \frac{\text{plant dose using average radionuclide concentrations}}{100} \right) < 1$$

Demonstration of compliance with the radon pathway shall be conducted independently of the other pathways.

(7) Recertification of a pathway exemption determination may be required by the Department.

[ED. NOTE: Tables referenced are available from the agency.]

[Publications: Publications referenced are available from the agency.]

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525

345-050-0036 - Gamma Pathway Exemption Interpretive Rule

(1) In determining compliance with OAR 345-050-0035 when considering external gamma radiation exposure, the Council or the Department ~~of Energy~~ must find that the disposal in Oregon of waste

Commented [JJ*D14]: (1) - (5) of this rule discuss what the Department must do, but (7) doesn't.

The Department must base its finding on an evaluation of potential radiation exposures and effluent releases, and subject to the following:

(7) Recertification of a pathway exemption determination may be required by the Department.

~~materials~~ containing naturally-occurring radioactive materials (NORM) cannot result in cumulative doses to individuals greater than ~~500~~100 millirem (mrem) per year: for all pathways of exposure excluding radon. If doses could exceed this limit, the Council or the Department shall find that the waste ~~material~~ is radioactive waste and requires disposal in a licensed radioactive waste disposal site. ~~To find the waste materials exempt, the Council or the Department must find that the waste materials meet air and water (including radon and leaching) pathway exemptions in OAR 345-050-0035.~~ To determine compliance with the gamma pathway exemption in OAR 345-050-0035, the following conditions apply:

~~(a) "Waste material" means the annual solid waste stream leaving a site for landfill disposal.~~

~~(b)(a)~~ Actual field gamma radiation exposures are measured. The exposure readings are compared with the levels given in section (2) of this rule. The levels given in section (2) correspond to a potential ~~500~~100 mrem dose per year. They are based on the dose a person might receive being 90 percent of the time in a house built on a homogeneous, semi-infinite plane (slab) of ~~NORM~~the evaluated waste assuming ~~the house has a two-inch wooden floor over a two-foot crawl space and assuming exposure is measured at three feet above the floor.~~ Computer modeling was used to correlate the radiation levels measured in the house to radiation from NORM in two container geometries -- a standard 55-gallon steel drum and a box measuring 1.5 x 1 x 2 feet (H x W x L).

~~(b)~~ Readings are in microRoentgen per hour (uR/hr) using a detection system that is sensitive enough to determine compliance with the gamma radiation levels in section (2). Systems are calibrated according to National Institute of Standards and Technology (NIST) procedures with an NIST-traceable source, or equivalent calibration as judged by the Council ~~Secretary or Department~~. Measurements are made at a distance of one foot from the waste container. The contents of the container are proportional in composition to the average waste material. The highest reading measured around the container is used.

~~(2)(2)~~ A sum of fractions approach shall be used to assess the contribution of the gamma exposure dose in combination with the Total Effective Dose Equivalent dose contributions from other applicable exposure pathways. The following readings correspond to a potential dose of ~~500~~100 millirem per year for the respective container geometries: from the gamma exposure pathway only. Long-lived radionuclides are assumed to be in secular equilibrium. ~~If measurements as described in subsection (1)(c) of this rule produce readings~~ The applicable gamma dose rate limit may be calculated from the benchmark dose rates below the following levels, the Council or the Department shall find the waste material is exempt based on the gamma pathway only: allowable proportion of gamma exposure dose from the waste relative to other exposure pathways, not to exceed 100 millirems total.

⋮

(a) Standard 55-gallon steel drum: ~~183.6~~183.6 uR/hr (above background) at one foot;

(b) Box (1.5H x 1W x 2L feet): ~~183.6~~183.6 uR/hr (above background) at one foot.

~~(3)~~ The Department may approve the use of exemption levels corresponding to container types other than those in section (2) to determine compliance if:

Commented [WM*015]: Note for the RAC, sub(a) is proposed to be deleted because "waste material" is defined above.

Commented [JJ16]: If this is the information from the 1979 building code discussed in the previous rule, you may want to consider adding this text (or relevant code text) to the previous rule if you plan to delete all of sub(a).

Commented [JJ17]: waste material?

(a) The exemption levels for other container types are derived by the same approved computer model (ISOSHL, Microshield, or equivalent) and the same assumptions used to calculate the exemption levels for the drum and the box in section (2);

(b) Measurements are made in compliance with subsections (1)(b) and (c);

(c) The contents of containers larger than a box or drum are uniformly mixed before readings are taken to determine compliance. If mixing of a large container is not feasible, the highest gamma reading from multiple representative locations one-foot away from the container shall be used to determine compliance.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525
Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525

345-050-0038 - Water Pathway Exemption Interpretive Rule

~~(1) In determining compliance with OAR 345-050-0035 when considering~~ (1) The values in Table 3 of this division represent the concentrations of radionuclides in effluents that correspond to a 100 millirem annual dose. When considering the dose contribution associated with release of effluents to water, the Council or the Department of Energy must find that the disposal in Oregon of waste materials containing naturally occurring radioactive materials (NORM) cannot result in effluents with annual average concentrations exceeding the values in Table 3 of this division. ~~If effluent concentrations could exceed this limit, the Council or the Department shall find that the waste material is radioactive and require disposal in a licensed radioactive waste disposal site, a proportion of the values in Table 3 that would result in a cumulative dose from all pathways exceeding 100 millirems per year (see OAR 345-050-0035(6)).~~ To find the waste materials exempt, the Council or the Department must also find that the waste materials meet air and gamma (including radon release) pathway exemptions in OAR 345-050-0035. To determine compliance with the water pathway exemption in OAR 345-050-0035, the following conditions apply:

~~(a) "Waste material" means the annual solid waste stream leaving a site for landfill disposal.~~

(b) At least four representative samples of the waste stream being evaluated must be tested using EPA Method 1312, "Synthetic precipitation leaching procedure" (SPLP). The resultant extractant must be analyzed for the known or suspected radioactive constituents in the waste by a procedure of suitable accuracy and specificity that is approved by the Department.

(c) The averaged results of the analysis of the extractant samples shall be compared to the values for concentrations in water above natural background shown in **Table 3** of this division. Under a sum of fractions approach, the dose contribution equivalent of the extractant sample concentrations may be derived from the Table 3 values, which represent the individual effluent concentrations that correspond to a 100 millirem annual dose. -When only one average waste stream is considered, the sum of fractions value can be calculated by dividing each average radionuclide concentration by their respective Table 3 value, and taking the sum across all detected radionuclides. -If a site of generation average is being considered, the sum of fractions for each waste stream should be

Commented [JJ18]: Suggest limiting who can approve the model. Maybe "a Department approved"

multiplied by that component's percentage of the total site of generation waste, and a sum taken across all weighted fractions.

(2) The statistical results of the analyses of the SPLP extractants shall be reported to the Department.

~~(a) If the mean of the analytical results from the first sample set multiplied by a factor of 20 is greater than 50 percent of the value for the most restrictive isotope in Table 3 and if the coefficient of variation (the standard deviation of the sample divided by the mean of the sample set) is greater than 0.25, an additional set of samples must be analyzed to better characterize the waste stream. This statistical evaluation and, if indicated, reanalysis must be made after each set of analyses. No more than 20 analyses are required to characterize the waste stream, but it must be shown that a good faith effort was made to analyze representative samples.~~

~~(b) If the mean of the analytical results from the first sample set multiplied by a factor of 20 is less than 50 percent of the value for the most restrictive isotope in Table 3, no further analyses are required.~~

(3) If the mean value from the analyses of the SPLP extractants for a single isotope ~~multiplied by a factor of 20~~ exceeds the value in Table 3, the waste material is radioactive waste under Oregon law. If more than one radioactive isotope is present and the sum of the ratios/fractions of the individual concentrations of those isotopes ~~multiplied by a factor of 20~~ to the values in **Table 3** for those isotopes is greater than 1, the waste material is radioactive waste under Oregon law. See Note 1 in **Table 3**. If other exposure pathways are applicable (e.g., external gamma, plant uptake), the total dose from all pathways must also not exceed 100 millirems per year.

[ED. NOTE: Tables referenced are available from the agency.]

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525

345-050-0039 – Plant Uptake Pathway Exemption Interpretive Rule

- A sum of fractions approach should be used to demonstrate compliance with the 100 millirem/year standard.
- Cumulative dose impacts not associated with direct gamma, leachability, or radon (e.g., plant uptake, soil ingestion, meat, milk) shall be based on a RESRAD model using the following parameters:
 - Account for ingrowth of all radionuclides? (input concentrations of radionuclides based on available empirical data and let RESRAD handle the ingrowth?)
 - Secular equilibrium shall be assumed, except in cases where a waste is enriched in NORM daughter isotopes, in which case the evaluation shall be based on the concentration of those enriched daughters in the waste at the time of evaluation.
 - Assume semi-infinite plane or a specified garden plot? Does it matter if the assessment is based on how much a person eats?

Commented [JJ19]: There appears to be a word missing or a few extra words.

Commented [WM*O20]: Note for the RAC. It has been suggested that a plant update component be added to the pathway exemption determination. We have listed concepts and questions for the RACs consideration in developing the parameters for such an evaluation and would appreciate feedback on the concepts.

- All other parameters shall follow the RESRAD default scenario at the time of this rule revision unless alternative parameters are approved by the Department.

DEQ Comments
August 2023

**OAR CHAPTER 345 – OREGON ENERGY FACILITY SITING COUNCIL
RULES EFFECTIVE JAN. 1, 2022**

DIVISION 50 – RADIOACTIVE WASTE MATERIALS

<u>345-050-0006 – Disposal Prohibited</u>	<u>11</u>
<u>345-050-0010 – Purpose and Applicability</u>	<u>Error! Bookmark not defined.2</u>
<u>345-050-0020 – Exempt Quantities</u>	<u>32</u>
<u>345-050-0025 – Exempt Concentrations</u>	<u>Error! Bookmark not defined.3</u>
<u>345-050-0030 – Specific Exemptions</u>	<u>333</u>

Style Definition: TOC 3
Formatted: TOC 3

**OAR CHAPTER 345 – OREGON ENERGY FACILITY SITING COUNCIL
RULES EFFECTIVE JAN. 1, 2022**

DIVISION 50 - RADIOACTIVE WASTE MATERIALS

345-050-0006 - Disposal Prohibited

~~Except (1) As provided under ORS 469.525, no radioactive waste shall be disposed of within this state, no person may arrange for disposal of radioactive waste within this state, no person may transport radioactive waste for disposal in this state and no waste disposal facility for any radioactive waste shall be established, operated or licensed within this state, except~~ as provided in ORS ~~chapter 469-525~~ and this division, ~~a person shall not hold or place discarded or unwanted radioactive material for more than seven days at any geographical site in Oregon except.~~

~~345-050-0010~~xx - Purpose and Applicability

(1) Because virtually all materials contain some radioactivity, the purpose of the rules in ~~this division~~ [OAR 345-050-0006 through 345-050-0039](#) is to identify those materials that present such small health hazards that they are ~~exempt from the provisions of ORS 469.525~~ [not considered to be radioactive waste](#) and may be disposed of within the state.

(2) ~~The rules in this division~~ [OAR 345-050-0040 through 345-050-0130](#) establish standards for the siting of facilities for disposal of [radioactive](#) wastes that were generated before June 1, 1981, through industrial or manufacturing processes and that contain naturally occurring radioactive isotopes. These rules implement the requirements of ORS 469.375, 469.470 and 469.501 to 469.559 for such waste disposal facilities.

(3) Except as provided in OAR 345-050-0060, these rules do not apply to uranium mine overburden or uranium mill tailings, mill wastes or mill by-product material that are subject to OAR chapter 345, divisions 92 and 95.

~~4) In accordance with ORS 469.525, the Department may establish an enforceable timeline or other requirements to determine whether a material is radioactive waste.~~

(5) For the ~~site at which the~~ purposes of this rule, disposal does not include:

~~(a) Temporary storage and staging of radioactive material was waste used or generated according to a license under ORS 453.635 as part of regular site operations or a site of a thermal power plant used for the temporary storage of radioactive material from that plant for which the Council issued a site certificate.~~

~~(b) Temporary storage of radioactive waste at the Trojan Spent Fuel Storage Installation, subject to the provisions of OAR 345-026-0300 through 345-026-0390~~

Commented [WM*O1]: Note, this section moved from below

Commented [SS*D2]: Consider adding, "and stored or staged in accordance with a state license."

**ORAR CHAPTER 345 – OREGON ENERGY FACILITY SITING COUNCIL
RULES EFFECTIVE JAN. 1, 2022**

(c) Temporary storage of radioactive waste from a reactor for which a site certificate has been issued pursuant to this chapter that is operated by a college, university or graduate center for research purposes and is not connected to the Northwest Power Grid; and

(d) Temporary storage of ~~other~~ radioactive waste at a facility not licensed under ORS 453.635 pending lawful disposal out of this state, subject to the following:

(i) Any person that intends to temporarily store radioactive waste- must report to the Department and Oregon Health Authority within 10 business days of discovery of such waste. The Department, in consultation with Oregon Health Authority, must determine that temporary storage of radioactive waste presents no significant risk to health and safety of the public and workforce. obtain a determination and authorization from the Oregon Health Authority that sufficient systems, structures, and processes are in place to ensure the radioactive waste will can be safely handled and stored pending lawful disposal and that facility staff are informed of best practices; In order to determine that a radioactive waste presents no significant risk during temporary storage, it must be demonstrated that:

1A) the waste will be located in an area of a facility that is reasonably expected to be inaccessible to the public,

2B) the waste will be clearly marked and cordoned or otherwise isolated from workers, and must be stored in such a manner that minimizes risk of mobilization;

3C) workers will be informed and instructed on safety related to the waste;

4D) any other requirements as determined by the Department in consultation with Oregon Health Authority and the holder of the waste.

(ii) Temporary storage may not exceed 90 days without prior written authorization from the Department. To grant authorization to temporarily store radioactive waste for more than 90 days, the Department, in ~~consultation~~ collaboration with Oregon Health Authority, ~~must~~ determine that the radioactive waste presents no significant risk to public health and safety during storage and must be assured that the waste will be properly disposed as soon as reasonably achievable, not to exceed 180 days in total.

Commented [SS*D3]: This clause may be too vague to enforce. Consider something more objective/specific.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525

345-050-00XX – Radioactive Waste Determination Process and Schedule

If through process knowledge, radiation screening, or waste characterization data, or other means a person discovers that a material at a facility not licensed under ORS 453.635 is likely known or suspected to be radioactive waste, that person must report to the Department and the Oregon Health Authority as soon as possible, but within 10 business days. In accordance with ORS 469.525, The Department may

**OAR CHAPTER 345 – OREGON ENERGY FACILITY SITING COUNCIL
RULES EFFECTIVE JAN. 1, 2022**

~~establish an enforceable timeline or other requirements to determine whether the material is radioactive waste.~~

345-050-00205 - Exempt Concentrations

(1) Materials ~~are exempt from the provisions of ORS 469.525 provided that such materials contain radioactive materials/radionuclides~~ in concentrations ~~not below the applicable concentration identified in excess of those of Table 1.~~ **are not radioactive waste for** purposes of ORS 469.525 and these rules.

(2) Radium-bearing materials containing less than 5 picocuries of radium-226 per gram of solid, regardless of quantity.

(3) Thorium-bearing materials containing less than 20 picocuries of radium-228 per gram of solid, if the radium-228 is present with the parent thorium-232, regardless of quantity.

(4) Lead-210-bearing wastes which are not in equilibrium with uranium-238, are the result of fossil fuel-related production including refining, transport, or storage, and contain less than 10 picocuries per gram of solid regardless of quantity.

Commented [WM*04]: Note, this was previously -0025

Commented [ST*05]: Not new language, moved from "specific exemptions" for ease of use

345-050-00250 - Exempt Quantities

(1) Materials ~~are exempt from provisions of ORS 469.525 if such material that contain radioactive material/radionuclides~~ in individual quantities ~~none of which exceeds that do not exceed~~ the applicable quantity ~~set forth identified in Table 2~~ **are not radioactive waste for the purposes of ORS 469.525 and these rules unless** the number of individual quantities ~~does not exceed radionuclides at their maximum allowable activity given in Table 2 exceeds 10.~~

(2) Burial of a human body containing radioactive materials used for diagnostic or therapeutic purposes is exempt from the provisions of ORS 469.525 if the burial is otherwise done in accordance with applicable Oregon law.

(3) Radium-bearing material containing a total radium-226 activity of less than 10 microcuries, regardless of concentration.

(4) Thorium-bearing materials containing a total radium-228 activity of less than 100 microcuries, if the radium-228 is present with the parent thorium-232, regardless of concentration in the solid.

Commented [WM*06]: Exemption for human body moved to 'specific exemption' below

Commented [ST*07]: Not new language, moved from "specific exemptions" for ease of use

[ED. NOTE: The Table referenced in this rule is not printed in the OAR Compilation. Copies are available from the agency.]

345-050-0030 - Specific Exemptions

In addition to the exemptions under OAR 345-050-0020 and 345-050-0025, the following materials are exempt from the provisions of ~~rule~~ **ORS 469.525 and OAR 345-050-0006:**

Error! No text of specified style in document.

**OAR CHAPTER 345 – OREGON ENERGY FACILITY SITING COUNCIL
RULES EFFECTIVE JAN. 1, 2022**

(1) Radioactive material ~~excluding NORM materials~~, that has been incorporated into a consumer product manufactured under a license issued by the Nuclear Regulatory Commission (NRC) or by an Agreement State, if the NRC or the Agreement State that issued the license has determined that the possession, use, transfer and disposal of such consumer product are exempt from regulatory requirements. An "Agreement State" is a state to which the NRC has delegated its authority to license and regulate byproduct materials (radioisotopes), source materials (uranium and thorium) and certain quantities of special nuclear materials in accordance with section 274b of the Atomic Energy Act.

~~(2) Radium-bearing materials containing less than 5 picocuries of radium-226 per gram of solid, regardless of quantity.~~

~~(3) Radium-bearing material containing a total radium-226 activity of less than 10 microcuries, regardless of concentration.~~

~~(4) Thorium-bearing materials containing less than 20 picocuries of radium-228 per gram of solid, if the radium-228 is present with the parent thorium-232, regardless of quantity.~~

~~(5) Thorium-bearing materials containing a total radium-228 activity of less than 100 microcuries, if the radium-228 is present with the parent thorium-232, regardless of concentration in the solid.~~

~~(6)~~

(2) Medical, industrial and research laboratory wastes contained in small, sealed, discrete containers in which the radioactive material is dissolved or dispersed in an organic solvent or biological fluid for the purpose of liquid scintillation counting and experimental animal carcasses that are disposed of or treated at a hazardous waste disposal facility licensed by the U.S. Environmental Protection Agency (U.S. EPA), by the Oregon Department of Environmental Quality, or by another state delegated the responsibility to regulate the disposal or treatment of hazardous waste by the U.S. EPA.

~~(23) Burial of a human body containing radioactive materials used for diagnostic or therapeutic purposes is exempt from the provisions of ORS 469.525 if the burial is otherwise done in accordance with applicable Oregon law.~~

Commented [SS*D8]: No idea if this is relevant or should be considered - pets may be treated with chemotherapy.

Commented [ST*09]: Not new, moved from "exempt quantities" for ease of use

~~(7) Wastes generated before June 1, 1981, through industrial or manufacturing processes that contain only naturally occurring radioactive isotopes, if such wastes are disposed of at a facility for which the Council has issued a site certificate in accordance with ORS 469.375 and OAR 345-050-0040 through 345-050-0130.~~

~~(8) Maintenance of radioactive coal ash at the site of a thermal power plant for which the Council has issued a site certificate.~~

~~(9)(34) Waste that an Oregon Health Authority assessment affirms results from the metabolism of isotopes used in medical treatment which only contain isotopes that will decay to activities below Table 2 limits within XX90? days. Exemption requires Oregon Health Authority determination as to the waste~~

**OAR CHAPTER 345 – OREGON ENERGY FACILITY SITING COUNCIL
RULES EFFECTIVE JAN. 1, 2022**

composition and activity and conclusion that the material presents no significant risk to the public, workers, or the environment.

OR

(4) Waste that a facility-specific plan reviewed by in consultation with is identified as the result of metabolized isotopes used in medical treatment. A facility may only dispose of such waste in accordance with a facility-specific plan approved by the Department in consultation with Oregon Health Authority. The plan must ensure that the material presents no significant risk to the public, workers, or the environment. The plan, at a minimum, should include:

- (a) how the facility will identify and confirm that waste is the result of metabolized isotopes used in medical treatment;
- (b) information regarding worker safety and training;
- (c) how the facility will manage waste that is determined to not be the result of metabolized isotopes used in medical treatment; and
- (d) a tracking and reporting schedule for informing the Department and Oregon Health Authority of actions taken under the plan.

(345) Wastes containing only naturally occurring radioactive isotopes other than those in the uranium and thorium decay series, as long as the isotopes exist in their naturally occurring isotopic concentrations.

(456) Wastes legally disposed before [DATE OF REVISION] provided the waste is not removed from the location of original disposal.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525

Commented [ST*O10]: Alternate and preferred version

League Of Women Voters of Oregon
Comments
August 2023

OAR CHAPTER 345 – OREGON ENERGY FACILITY SITING COUNCIL
RULES EFFECTIVE JAN. 1, 2022

DIVISION 50 - RADIOACTIVE WASTE MATERIALS

<u>345-050-0006 - Disposal Prohibited</u>	<u>1</u>
<u>345-050-0010 - Purpose and Applicability.....</u>	<u>Error! Bookmark not defined.2</u>
<u>345-050-0020 - Exempt Quantities.....</u>	<u>32</u>
<u>345-050-0025 - Exempt Concentrations.....</u>	<u>Error! Bookmark not defined.2</u>
<u>345-050-0030 - Specific Exemptions.....</u>	<u>433</u>

OAR CHAPTER 345 – OREGON ENERGY FACILITY SITING COUNCIL
RULES EFFECTIVE JAN. 1, 2022

DIVISION 50 - RADIOACTIVE WASTE MATERIALS

345-050-0006 - Disposal Prohibited

~~Except (1) As provided under ORS 469.525, no radioactive waste shall be disposed of within this state, no person may arrange for disposal of radioactive waste within this state, no person may transport radioactive waste for disposal in this state and no waste disposal facility for any radioactive waste shall be established, operated or licensed within this state, except as provided in ORS chapter 469.525 and this division, a person shall not hold or place discarded or unwanted radioactive material for more than seven days at any geographical site in Oregon except.~~

Commented [SW1]: Well said.

345-050-0010xx - Purpose and Applicability

(1) Because virtually all materials contain some radioactivity, the purpose of the rules in ~~this division~~ OAR 345-050-0006 through 345-050-0039 is to identify those materials that present such small health hazards that they are ~~exempt from the provisions of ORS 469.525~~ not considered to be radioactive waste and may be disposed of within the state.

Commented [WM*O2]: Note, this section moved from below

(2) ~~The rules in this division~~ OAR 345-050-0040 through 345-050-0130 establish standards for the siting of facilities for disposal of radioactive wastes that were generated before June 1, 1981, through industrial or manufacturing processes and that contain naturally occurring radioactive isotopes, ~~but whose removal has been determined to pose a significantly greater threat to the public health and safety than maintaining it in place.~~ These rules implement the requirements of ORS 469.375, 469.470 and 469.501 to 469.559 for such waste disposal facilities.

Commented [SW3]: The body of rules referenced here is outside the scope of this RAC so I have not studied them thoroughly, but I'm proposing these language modifications as suggestions that might improve clarity. I will note that I believe 345-050-0040, per se, would be improved significantly by inserting "that were generated before June 1, 1981" at the end of the first sentence. I believe the current language leaves a seriously wrong impression.

(3) ~~Temporary holding of radioactive waste materials generated or in use in Oregon until they can be transported out of state is not disposal for purposes of these rules. OAR 345-050-00yy outlines procedures to ensure public health and safety prior to transport.~~

Commented [SW4]: First, this segment of the draft is, in my view, a vast improvement and I'm glad to see it. But I have some thoughts. Perhaps minor, I suggest using the term "holding" rather than "storage" throughout because in other parts of the rules and perhaps in general, "storage" may suggest something akin to "disposal" whereas "holding" has more of a "temporary" sense to it. Your call on the semantics. More importantly, I'm suggesting creating a whole new numbered subsection for the "Temporary" issue and placing it after 345-050-0130 (I'd envision it better after 0039, but that would require massive renumbering). I propose this to underscore the uniqueness these materials from all of the other various types of materials dealt with in 345-050, but also their parity in terms of importance. That is, by their characteristics, they indeed "[present] a significant danger to the public health and safety" (as do pre-1981 materials or tailings), but their removal from the state must be dealt with very specifically as a practical matter and safely.

(34) Except as provided in OAR 345-050-0060, these rules do not apply to uranium mine overburden or uranium mill tailings, mill wastes or mill by-product material that are subject to OAR chapter 345, divisions 92 and 95.

4) ~~In accordance with ORS 469.525, the Department may establish an enforceable timeline or other requirements to determine whether a material is radioactive waste.~~

Commented [SW5]:

(5) ~~For the site at which the purposes of this rule, disposal does not include:~~

Commented [SW6R5]: Please see my comment below referencing the deletion of what was 345-050-00xx - Radioactive Waste Determination Process and Schedule in draft #2.

**OAR CHAPTER 345 – OREGON ENERGY FACILITY SITING COUNCIL
RULES EFFECTIVE JAN. 1, 2022**

~~(a) Temporary storage and staging of radioactive material waswaste used or generated according to a license under ORS 453.635 as part of regular site operations or a site of a thermal power plant used for the temporary storage of radioactive material from that plant for which the Council issued a site certificate;~~

~~(b) Temporary storage of radioactive waste at the Trojan Spent Fuel Storage Installation, subject to the provisions of OAR 345-026-0300 through 345-026-0390~~

~~(c) Temporary storage of radioactive waste from a reactor for which a site certificate has been issued pursuant to this chapter that is operated by a college, university or graduate center for research purposes and is not connected to the Northwest Power Grid; and~~

~~(d) Temporary storage of other radioactive waste at a facility not licensed under ORS 453.635 pending lawful disposal out of this state, subject to the following:~~

~~(i) Any person that intends to temporarily store radioactive waste must report to the Department and Oregon Health Authority within 10 business days of discovery of such waste. The Department, in consultation with Oregon Health Authority, must determine that temporary storage of radioactive waste presents no significant risk to health and safety of the public and workforce, obtain a determination and authorization from the Oregon Health Authority that sufficient systems, structures, and processes are in place to ensure the radioactive waste will can be safely handled and stored pending lawful disposal and that facility staff are informed of best practices; In order to determine that a radioactive waste presents no significant risk during temporary storage, it must be demonstrated that:~~

~~1A) the waste will be located in an area of a facility that is reasonably expected to be inaccessible to the public;~~

~~2B) the waste will be clearly marked and cordoned or otherwise isolated from workers; and must be stored in such a manner that minimizes risk of mobilization;~~

~~3C) workers will be informed and instructed on safety related to the waste;~~

~~4D) any other requirements as determined by the Department in consultation with Oregon Health Authority and the holder of the waste.~~

~~(ii) Temporary storage may not exceed 90 days without prior written authorization from the Department. To grant authorization to temporarily store radioactive waste for more than 90 days, the Department, in consultationcollaboration with Oregon Health Authority, must determine that the radioactive waste presents no significant risk to public health and safety during storage andmust be assured that the waste will be properly disposed as soon as reasonably achievable, not to exceed 180 days in total.~~

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525

ORAR CHAPTER 345 – OREGON ENERGY FACILITY SITING COUNCIL
RULES EFFECTIVE JAN. 1, 2022

345-050-00XX – Radioactive Waste Determination Process and Schedule

~~If through process knowledge, radiation screening, or waste characterization data, or other means a person discovers that a material at a facility not licensed under ORS 453.635 is likely known or suspected to be radioactive waste, that person must report to the Department and the Oregon Health Authority as soon as possible, but within 10 business days. In accordance with ORS 469.525, The Department may establish an enforceable timeline or other requirements to determine whether the material is radioactive waste.~~

345-050-00205 - Exempt Concentrations

~~(1) Materials are exempt from the provisions of ORS 469.525 provided that such materials contain radioactive materials/radionuclides in concentrations not below the applicable concentration identified in excess of those of Table 1. are not radioactive waste for purposes of ORS 469.525 and these rules.~~

~~(2) Radium-bearing materials containing less than 5 picocuries of radium-226 per gram of solid, regardless of quantity.~~

~~(3) Thorium-bearing materials containing less than 20 picocuries of radium-228 per gram of solid, if the radium-228 is present with the parent thorium-232, regardless of quantity.~~

~~(4) Lead-210-bearing wastes which are not in equilibrium with uranium-238, are the result of fossil fuel-related production including refining, transport, or storage, and contain less than 10 picocuries per gram of solid regardless of quantity.~~

345-050-00250 - Exempt Quantities

~~(1) Materials are exempt from provisions of ORS 469.525 if such material that contain radioactive material/radionuclides in individual quantities none of which exceeds that do not exceed the applicable quantity set forth identified in Table 2 are not radioactive waste for the purposes of ORS 469.525 and these rules unless the number of individual quantities does not exceed radionuclides at their maximum allowable activity given in Table 2 exceeds 10.~~

~~(2) Burial of a human body containing radioactive materials used for diagnostic or therapeutic purposes is exempt from the provisions of ORS 469.525 if the burial is otherwise done in accordance with applicable Oregon law.~~

~~(3) Radium-bearing material containing a total radium-226 activity of less than 10 microcuries, regardless of concentration.~~

Commented [SW7]: I continue to have concerns about the subject matter that was, in the second draft, placed here, but now all but the final sentence [now at 345-050-00xx(4)] is all that remains. 1) in earlier comments I questioned whether ORS 469.525(2) can be fully implemented if the rules do not include (only "may" include, which as of this draft is the case) an enforceable timeline or other requirements to determine whether a material is radioactive."? 2) I was thinking by the end of the 2nd draft that we were headed in the direction of at least giving the Department some means to be made aware of and identify through investigation materials that potentially would present danger to the public health and safety so that they could be dealt with appropriately. In the current (3rd) draft, that language has been eliminated altogether. ODOE's "Comment Resolution" to some of my June 24 comment on what was then 345-050-00xx referred me to what I believe may be 345-029-010, prescribing actions to be taken upon discovery of potentially illegal radioactive waste. I served on the RAC for Division 029 and it's my understanding that that rule applies only to licensed facilities whereas the issue being dealt with in the current RAC's discussions also pertained to unlicensed facilities. In ODOE's Comment Resolution to OBI's concern about report, etc., in the Draft #2 version of 345-050-00xx, it appears that some of the language about procedures was moved to the current 345-050-00xx, which now covers not discovery of potentially hazardous waste anywhere through various means, rather materials retained at an unlicensed facility for temporary holding. To me, this is an important, but different matter and the elimination of the language leaves a gap.

Commented [WM*08]: Note, this was previously -0025

Commented [SW9]: I lack the expertise to comment on the substance of this subsection, but its internal construction is inconsistent. There could be a simple solution to fix the disjointed situation, but some editing is needed for clarity.

Commented [SW10]: This is a sentence fragment. I lack the expertise to comment on the substance of this subsection, but it seems to me that (2) is incomplete. If the intent is to somehow tie it to the explanation in (1), that doesn't appear to have happened.

Commented [ST*011]: Not new language, moved from "specific exemptions" for ease of use

Commented [SW12]: Same as just above.

Commented [SW13]: This (4) stands on its own as a sentence, but as I read it, it also lacks a clear connection to, and flow within, 345-050-0020.

Commented [SW14]: Similar editing is needed in this subsection.

Commented [WM*015]: Exemption for human body moved to 'specific exemption' below

Commented [SW16]: Unconnected fragment as above. Also, this should be (2).

**OAR CHAPTER 345 – OREGON ENERGY FACILITY SITING COUNCIL
RULES EFFECTIVE JAN. 1, 2022**

~~(4) Thorium-bearing materials containing a total radium-228 activity of less than 100 microcuries, if the radium-228 is present with the parent thorium-232, regardless of concentration in the solid.~~

[ED. NOTE: The Table referenced in this rule is not printed in the OAR Compilation. Copies are available from the agency.]

345-050-0030 - Specific Exemptions

In addition to the exemptions under OAR 345-050-0020 and 345-050-0025, the following materials are exempt from the provisions of [rule ORS 469.525](#) and [OAR 345-050-0006](#):

(1) Radioactive material, ~~excluding NORM materials,~~ that has been incorporated into a consumer product manufactured under a license issued by the Nuclear Regulatory Commission (NRC) or by an Agreement State, if the NRC or the Agreement State that issued the license has determined that the possession, use, transfer and disposal of such consumer product are exempt from regulatory requirements. An "Agreement State" is a state to which the NRC has delegated its authority to license and regulate byproduct materials (radioisotopes), source materials (uranium and thorium) and certain quantities of special nuclear materials in accordance with section 274b of the Atomic Energy Act.

~~(2) Radium-bearing materials containing less than 5 picocuries of radium-226 per gram of solid, regardless of quantity.~~

~~(3) Radium-bearing material containing a total radium-226 activity of less than 10 microcuries, regardless of concentration.~~

~~(4) Thorium-bearing materials containing less than 20 picocuries of radium-228 per gram of solid, if the radium-228 is present with the parent thorium-232, regardless of quantity.~~

~~(5) Thorium-bearing materials containing a total radium-228 activity of less than 100 microcuries, if the radium-228 is present with the parent thorium-232, regardless of concentration in the solid.~~

~~(6)~~

(2) Medical, industrial and research laboratory wastes contained in small, sealed, discrete containers in which the radioactive material is dissolved or dispersed in an organic solvent or biological fluid for the purpose of liquid scintillation counting and experimental animal carcasses that are disposed of or treated at a hazardous waste disposal facility licensed by the U.S. Environmental Protection Agency (U.S. EPA), by the Oregon Department of Environmental Quality, or by another state delegated the responsibility to regulate the disposal or treatment of hazardous waste by the U.S. EPA.

~~(23) Burial of a human body containing radioactive materials used for diagnostic or therapeutic purposes is exempt from the provisions of ORS 469.525 if the burial is otherwise done in accordance with applicable Oregon law.~~

(7) Wastes generated before June 1, 1981, through industrial or manufacturing processes that contain only naturally occurring radioactive isotopes, if such wastes are disposed of at a facility for which the

Commented [ST*O17]: Not new language, moved from "specific exemptions" for ease of use

Commented [SW18]: Also a fragment. Same as two comments above.

Commented [SW19]: Should be (3) and same editing need as above.

Commented [SW20]: I lack the expertise to comment.

Commented [SW21]: I believe it would strengthen this subsection if reference could be made to authorizing statute. By the way, the organization of this subsection doesn't suffer from the same construction issues noted above. Perhaps it could serve as a model, as it opens with an unnumbered statement and indicates that applicable occasions follow.

Commented [SW22]: I am trusting the experts to have ensured that removal of these items from here to 345-050-0020 and 345-050-025, respectively, is due to the fact that the concentrations or quantities, indeed, "present no significant danger to the public health and safety."

Commented [ST*O23]: Not new, moved from "exempt quantities" for ease of use

**OAR CHAPTER 345 – OREGON ENERGY FACILITY SITING COUNCIL
RULES EFFECTIVE JAN. 1, 2022**

Council has issued a site certificate in accordance with ORS 469.375 and OAR 345-050-0040 through 345-050-0130.

(8) Maintenance of radioactive coal ash at the site of a thermal power plant for which the Council has issued a site certificate.

(9) Waste that an Oregon Health Authority assessment affirms results from the metabolism of isotopes used in medical treatment which only contain isotopes that will decay to activities below Table 2 limits within XX90? days. Exemption requires Oregon Health Authority determination as to the waste composition and activity and conclusion that the material presents no significant risk to the public, workers, or the environment.

OR

(4) Waste that a facility-specific plan reviewed by in consultation with is identified as the result of metabolized isotopes used in medical treatment. A facility may only dispose of such waste in accordance with a facility-specific plan approved by the Department in consultation with Oregon Health Authority. The plan must ensure that the material presents no significant risk to the public, workers, or the environment. The plan, at a minimum, should include:

- (a) how the facility will identify and confirm that waste is the result of metabolized isotopes used in medical treatment;
- (b) information regarding worker safety and training;
- (c) how the facility will manage waste that is determined to not be the result of metabolized isotopes used in medical treatment; and
- (d) a tracking and reporting schedule for informing the Department and Oregon Health Authority of actions taken under the plan.

(345) Wastes containing only naturally occurring radioactive isotopes other than those in the uranium and thorium decay series, as long as the isotopes exist in their naturally occurring isotopic concentrations.

(456) Wastes legally disposed before [DATE OF REVISION] provided the waste is not removed from the location of original disposal.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525

345-050-00yy – Allowable Temporary Holding

(5) For the purposes of this rule, temporary holding is allowed under certain circumstances and parameters as follows:

Commented [ST*O24]: Alternate and preferred version

Commented [SW25]: I explained above my reasons for creating this as a separate subsection above in 345-050-00xx, as well as my suggestion to replace "storage" with "hold" or "holding" when speaking of allowable "temporary" action. I'm not wedded to the latter, but I think it might be helpful. Overall, I support how this matter has been handled in terms of describing processes and safety safeguards.

**OAR CHAPTER 345 – OREGON ENERGY FACILITY SITING COUNCIL
RULES EFFECTIVE JAN. 1, 2022**

(a) Temporary holding and staging of radioactive waste used or generated according to a license under ORS 453.635 as part of regular site operations;

(b) Temporary holding of radioactive waste at the Trojan Spent Fuel Storage Installation, subject to the provisions of OAR 345-026-0300 through 345-026-0390;

(c) Temporary holding of radioactive waste from a reactor for which a site certificate has been issued pursuant to this chapter that is operated by a college, university or graduate center for research purposes and is not connected to the Northwest Power Grid; and

(d) Temporary holding of radioactive waste at a facility not licensed under ORS 453.635 pending lawful disposal out of this state, subject to the following:

(i) Any person that intends to temporarily hold radioactive waste must report to the Department and Oregon Health Authority within 10 business days of discovery of such waste. The Department, in consultation with Oregon Health Authority, must determine that temporary storage of radioactive waste presents no significant risk to health and safety of the public and workforce. In order to determine that a radioactive waste presents no significant risk during temporary holding, it must be demonstrated that:

A) the waste will be located in an area of a facility that is reasonably expected to be inaccessible to the public;

B) the waste will be clearly marked and cordoned or otherwise isolated from workers, and must be stored in such a manner that minimizes risk of mobilization;

C) workers will be informed and instructed on safety related to the waste;

D) any other requirements as determined by the Department in consultation with Oregon Health Authority and the holder of the waste will be met.

(ii) Temporary holding may not exceed 90 days without prior written authorization from the Department. To grant authorization to temporarily hold radioactive waste for more than 90 days, the Department, in collaboration with Oregon Health Authority, must be assured that the waste will be properly disposed as soon as reasonably achievable, not to exceed 180 days in total.

Commented [SW26]: I replaced a comma with a semi-colon.

Commented [SW27]: I added these words.

OBI Comments
Aug 2023

Aug. 30, 2023

Thomas L. Jackman
Rulemaking Coordinator
Oregon Department of Energy
550 Capitol St., NE, 1st Floor
Salem, OR 97301

Via email: Tom.Jackman@energy.oregon.gov

Re: "Part 1" Draft Rule Language, Radioactive Waste Rulemaking Project

Dear Tom:

Oregon Business & Industry (OBI) appreciates this opportunity to provide feedback on the updated draft "Part 1" rule language shared on July 31, 2023, with members of the rulemaking advisory committee (RAC) for the Radioactive Waste Materials rulemaking project.

OBI is a statewide association representing businesses from a wide variety of industries and from each of Oregon's 36 counties. In addition to being the statewide chamber of commerce, OBI is the state affiliate for the National Association of Manufacturers and the National Retail Federation. Our 1,600 member companies, more than 80% of which are small businesses, employ more than 250,000 Oregonians. Oregon's private sector businesses help drive a healthy, prosperous economy for the benefit of everyone.

Several OBI member companies have tremendous experience implementing Oregon's radioactive waste regulatory program, and we support a program that is successful for all Oregonians. In OBI's view, a successful radioactive waste program is one that is safe, fair, based on sound public policy and science, and that makes efficient use of agency and regulated entity resources. We appreciate this opportunity to work with you and Oregon Department of Energy (ODOE) staff in your efforts to prepare draft rule language for consideration by the Energy Facility Siting Council (EFSC).

At this juncture, our understanding is that, while the current draft rule language may be used to inform future rulemaking by EFSC, formal rulemaking to adopt the draft rule language in accordance with Oregon's Administrative Procedures Act, ORS Chapter 183 has not begun. With that in mind, we would appreciate ODOE's consideration of our comments before ODOE staff present the draft Part 1 concept to EFSC. Our comments on the draft Part 1 rule language are provided below, organized by the specific rules listed in ODOE's July 31, 2023, draft.

345-050-0006 – Disposal Prohibited

OBI appreciates ODOE's decision to revise OAR 345-050-0006 to more closely track and implement the statutory language at ORS 469.525.

345-050-00xx – Purpose and Applicability

OBI greatly appreciates ODOE’s clarifying language in draft OAR 340-050-00xx(5)(d) to limit the requirements of subsection (5)(d) to “radioactive waste at a facility not licensed under ORS 453.635.” OBI understands ODOE’s clarifying language to mean that the proposed requirements of subsections (5)(d)(i) and (ii) are not applicable to radioactive waste managed pursuant to subsections (5)(a), (b) and (c). If OBI’s understanding does not match ODOE’s intent, we ask that ODOE have further discussions with the RAC before proposing subsection (5)(d) to EFSC for its consideration.

With respect to subsection (5)(d)(ii), OBI remains concerned about ODOE’s proposed 90-day (without written authorization) and 180-day (with written authorization) storage limits. While we can understand ODOE’s desire to keep storage of radioactive waste temporary, as detailed in our June 26, 2023, comment letter, our position is that ODOE can achieve its regulatory objectives without imposing unnecessary costs or constraints on either the regulated community or the department itself. Specifically, we ask that ODOE revise the draft rule language to enable the department to allow generators of radioactive waste subject to subsection (5)(d)(ii) to temporarily accumulate that waste on-site for up to 180 days without prior written authorization and for up to one year with written authorization from the department. This proposal reflects a compromise from the approach described in our June 26, 2023, comment letter, and we urge ODOE to revise the draft accordingly.

On OBI’s behalf, I wish to reiterate our appreciation to ODOE and its staff as it moves ahead with the radioactive waste rulemaking. We look forward to continuing our participation in that process.

Sincerely,



Sharla Moffett
Senior Policy Director

cc: Maxwell Woods

ORRA Comments
Aug 2023



OREGON REFUSE & RECYCLING ASSOCIATION

August 29, 2023

Oregon Department of Energy
Mr. Maxwell Woods, Assistant Director, Nuclear Safety and Emergency Preparedness Division
sent via email only to: maxwell.woods@energy.oregon.gov

Re: Radioactive Waste Materials Rulemaking Part 1 Rules

Dear Mr. Woods:

Thank you and your Oregon Department of Energy (ODOE) team for the opportunity to participate in the Radioactive Waste Rulemaking Advisory Committee (RAC) and comment on the July 31, 2023 draft Part 1 Rules. These are issues of critical importance to the Oregon Refuse and Recycling Association (ORRA) and its members, particularly the issue of radioactive medical waste.

Founded in 1965 to advance the efficiencies of collecting and processing recyclables and solid waste, ORRA is the statewide trade association representing solid waste management companies across Oregon. ORRA members collect, transport, and process most of Oregon's residential and commercial refuse and recyclables, as well as operate material recovery facilities and many of Oregon's municipal solid waste transfer stations, landfills, and compost facilities.

I, along with Andy Lombardo, Perma-Fix Environmental Services, Inc., an expert with over 35 years of experience with radiation protection/health physics and management participate as members of the Radioactive Waste Materials Rulemaking Advisory Committee representing ORRA and its members. Following ORRA's most recent comments submitted on June 28, 2023, these comments remain focused on radioactive medical waste.

In our June 28 comments ORRA provided information about the increase in activity of receiving radioactive medical waste and complexities of the disposal of this waste in Oregon. ORRA appreciates the consideration given to our comments and proposed changes to the draft rules. ORRA supports the revised language in the July 31 draft Part 1 Rule for 345-050-0030, section 4 for the disposal of radioactive medical waste.

In addition to comments on the July 31 draft Part 1 Rules, on August 11 RAC members were asked to provide feedback on the anticipated fiscal impact of the proposed rules. While ORRA member companies are not a local government entity, they provide essential solid waste services on behalf of cities and counties across the state. If the proposed rules result in increased costs, these costs could be borne by ratepayers.

The proposed rules entail requirements that do not currently exist so we are unable to provide a detailed analysis of what the fiscal impacts may be. Generally, ORRA members anticipate increased capital and operating costs associated with the proposed rules and support the initiative to protect our front-line employee's wellbeing. The highest priority of ORRA members remains protecting the health and safety of Oregonians and workers within the solid waste industry. The proposed language creates the ability for ODOE to approve a plan that allows our industry to work in tandem with state regulators to ensure this risk is effectively and safely managed.

Again, ORRA appreciates ODOE's work to address this this crucial issue. If you have questions, please do not hesitate to contact me at 503-507-8275 or andrea@orra.net.

Sincerely,



Andrea J. Fogue
Governmental Affairs Director

c: Tom Jackman, Rulemaking Coordinator, Oregon Department of Energy
Andy Lombardo, Perma-Fix Environmental Services, Inc.
Jim Denson, Waste Management
ORRA Steering Committee

Waste Management Comments
on Lead 210
Aug 2023

ODOE comments

<p>Comment:” WM has expressed on several occasions that the inclusion of a lead-210 limit is costly to the regulated community and does not convey any additional public health and safety protections...” “Pb-210 can be present at a higher activity concentration than Ra-226, such as in some oil and gas waste streams that are concentrated in Pb-210, Pb210 is a low energy beta-gamma emitter, consequently, risks from external exposure are negligible. Generally, Pb-210 is relatively immobile in groundwater due to its tendency to adsorb onto solid particles and sediments.” “Further, as Pb-210 is a low energy beta-gamma emitter, it is notoriously difficult to detect. Examining the laboratory data from nearly all pathway exemption reports to date indicates that Pb-210 is detected only ~30% of the time with gamma spectroscopy and ~50%”</p>	<p>Response: While Lead-210 itself is relatively low in radiotoxicity, its daughter product Polonium 210 is extremely radiotoxic and readily accumulates in aquatic organisms. Normally this isotope is regulated under the U-238 standard of 10 pCi/g (which includes daughters, assuming equilibrium). The majority of elevated analytical detection limits in pathway analyses are in samples with elevated Ra-226 and/or U-238. A exemption standard for enriched Lead 210 where common (fossil fuel related refining storage tanks, pipe, etc) is protective to the public, as a plugging of the equilibrium assumption loophole.</p> <p>Action Taken: Narrowed language in 345-050-0020(4) to indicate the exempt concentration applies to materials which have been found to be more commonly enriched in Lead-210.</p>
<p>Comment: "...lead-210 into the revised tables, OBI requests that ODOE provide this RAC additional time in which to consider any such changes as we are concerned about potential increased monitoring costs to the regulated community without corresponding benefit to public health and safety</p>	<p>Response: The issue of potential wastes enriched with Lead-210 has been discussed since 12/2021. Additional time to provide comment on the revised language will be available in the final 30 day RAC period and in the formal EFSC comment period.</p> <p>Action Taken: see 9</p>

Response

Lead-210 (Pb-210) has a 22.2-year half-life, far shorter than that of radium-226 (Ra-226, 1600 years) and uranium-238 (U-238, 4.5 billion years). Because of its relatively short half-life, the parent radionuclide, Ra-226, *must* be present in waste material for Pb-210 to be present long term. Lead-210 decays through Bismuth-210 to Polonium-210 (Po-210). Polonium-210 has an even shorter half-life than Pb-210 (138 days), and thus will not be present long term without the parent nuclides, Pb-210 and Ra-226. Accumulation in aquatic organisms is an interesting piece of information, but it is generally irrelevant to the landfill exposure scenario. Aquatic organisms require an aquatic environment and aquatic environments do not exist in permitted landfills. Polonium-210 can be present in groundwater, but there is no EPA drinking water standard for it. Lead-210 is a low energy beta-gamma emitter, consequently, risks from external exposure are negligible. Polonium-210 is an alpha emitter, and therefore not an external exposure hazard either, because alpha particles cannot penetrate the skin. Polonium-210 is a radiation hazard only if it enters the body through breathing, eating or via a wound. Cigarettes are likely the most common means by which individuals are exposed to Po-210.

Contrary to popular myth, Po-210 is not more radiotoxic than either Ra-226 or Pb-210 on a per unit activity basis. Table A below lists the ingestion, inhalation, and external dose coefficients for Po-210, Pb-210, and

Ra-226. As can be seen, Pb-210 has a higher ingestion dose coefficient compared to Po-210 and Ra-226 has a higher inhalation dose coefficient compared to that of Po-210 and Pb-210.

Also shown in the table are the bioconcentration factors, plant-soil concentration ratios, and beef and milk transfer coefficients. Note that Po-210 has a much higher bioconcentration factor in crustacea and mollusks. However, as discussed above aquatic environments do not exist in landfills thus this exposure pathway is irrelevant. Radium-226 has a higher plant-soil concentration ratio, and milk and meat transfer coefficient compared to Pb-210. More importantly, the ingestion and inhalation pathways from a landfill disposal require environmental transport or loss of control of the landfill which can take a significant amount of time (greater than 100 years).

The mobility of most radionuclides of the uranium decay series in water is limited by their tendency to bind strongly to organic matter and minerals in the soil and sediment. This process is characterized by the soil-water partitioning coefficient or K_d , and is defined by:

$$K_d = \frac{C_s}{C_a}$$

where

C_s = solid matrix concentration (pCi g⁻¹),

C_a = aqueous phase concentration (pCi mL⁻¹).

Representative K_d values are presented in Table A. A K_d value of zero means that all the radionuclide is in the aqueous phase and the radionuclide travels with the velocity of the water. The larger the K_d the less mobile the radionuclide is in groundwater (i.e., its movement is retarded). The amount of retardation is described by the retardation factor given by:

$$R_d = \frac{1 + K_d \rho}{\theta}$$

where

R_d = retardation factor (unitless),

ρ = bulk density (g cm⁻³),

θ = water-filled porosity (mL mL⁻¹).

Using representative values for water-filled porosity (0.3), bulk density (1.5 g cm⁻³), and the K_d value for Pb-210 in Table A (100 mL g⁻¹), the R_d is 501. That means the mobility of Pb-210 in groundwater is 501 times *lower* than the water itself. This renders Pb-210 sufficiently immobile such that any Pb-210 originally disposed will have decayed away and the remaining Pb-210 will be derived from the decay of Ra-226 and at an activity level no greater than Ra-226. Thus, the long-term dose consequences of Pb-210 can be controlled by limiting the amount of Ra-226 disposed. A similar situation exists for Ra-228 (half-life of 5.75 years) where long-term impacts are determined by its parent (Th-232).

The dissolution of Pb-210 from solid samples has also been shown to be minimal. For example, the pathway exemption report for wastes generated by Chevron Corporation at their El Segundo facility had the Pb-210 solid sample concentration of 9.65 pCi/g which triggered a leachate analysis. The corresponding leachate concentration was 0.00228 pCi/mL (2.28×10⁻⁹ μCi/mL). This value is well below the OAR Table 3 value of 1.0×10⁻⁷ μCi/mL.

Table A. Dose coefficients and environmental transport parameters for Ra-226, Pb-210, and Po-210.

Parameter	Po-210	Pb-210 ^d	Ra-226 ^e
Ingestion dose coefficient (mrem pCi ⁻¹) ^a	8.95E-04	1.31E-03	4.70E-04
Inhalation dose coefficient (mrem pCi ⁻¹) ^{a,b}	6.92E-03	2.05E-03	8.58E-03
External dose coefficient (mrem yr ⁻¹ per pCi g ⁻¹) ^c	5.60E-05	3.36E-03	1.07E+01
Soil-water partitioning coefficient, K_d , (mL g ⁻¹) ^f	1.00E+01	1.00E+02	7.00E+01
Bioconcentration factor for crustacea and mollusks (unitless) ^f	2.00E+04	1.00E+02	2.50E+02
Bioconcentration factor, fish (unitless) ^f	1.00E+02	3.00E+02	5.00E+01
Plant/soil concentration ratio (unitless) ^f	1.00E-03	1.00E-02	4.00E-02
Beef transfer factor (d kg ⁻¹) ^f	5.00E-03	8.00E-04	1.00E-03
Milk transfer factor (d L ⁻¹) ^f	3.40E-04	3.00E-04	1.00E-03

- a. Inhalation and ingestion dose coefficients are for an adult and taken from DOE-STD-1196-2022 (DOE 2022).
- b. Solubility types are those recommended by the International Commission on Radiation Protection. Radium and polonium are solubility type M, lead is solubility type F.
- c. External dose coefficients are for an adult and taken from FGR-15 (EPA 2019).
- d. Pb-210 external dose coefficient includes Bi-210.
- e. Ra-226 external dose coefficient includes Rn-222, Po-218, Pb-214, Bi-214.
- f. Environmental transport parameters are from RESRAD (Kamboj, 2018).

It has been demonstrated by Argonne National Laboratory (ANL 2014), the Norwegian Radiation Protection Authority (NRPA 2010), and by the Pennsylvania Department of Environmental Protection (PA DEP 2016) that Pb-210 by itself is not a significant contributor to dose from TENORM-bearing materials. This is consistent with preliminary RESRAD results presented by ODOE in the December 20, 2021 meeting, which demonstrate that Pb-210 is of limited consequence to dose for the air and water exposure pathways.

For these reasons, we recommend that Table 1 values for uranium decay products be expressly limited to natural uranium (U-238, U-234, and U-235); natural thorium (Th-232); and Ra-226. Separate Table 1 limits are unnecessary for relatively short-lived progeny radionuclides, e.g., Pb-210, Th-228, and Ra-228. By focusing regulatory efforts on materials with higher radiological risks and potential hazards, we can ensure the efficient use of resources while maintaining effective protection of public health and the environment.

References

- ANL (Argonne National Laboratory). 2014. Radiological Dose and Risk Assessment of Landfill Disposal of Technologically Enhanced Naturally Occurring Radioactive Materials (TENORM) in North Dakota. ANL/EVS-14/13.
- DOE (U.S. Department of Energy), 2022. *Derived Concentration Technical Standard* DOE-Std-1196-2022. U.S. Department of Energy, Washington DC.
- EPA (U.S. Environmental Protection Agency) 2019. *Federal Guidance Report No 15: External Exposure to Radionuclides in Air, Water, and Soil*. EPA-402-R-19-002. U.S. Environmental Protection Agency, Washington DC.

Kamboj, S., E. Gnanapragasam, and C. Yu, 2018, *User's Guide to RESRAD-ONSITE Code, Version 7.2*, ANL/EVS/TM-18/1 Argonne National Laboratory Environmental Science Division, March 2018.

NRPA (Norwegian Radiation Protection Authority). 2010. Radiological Impact of Shore-Based Disposal of Wastes from the Oil and Gas Industry. An assessment carried out for the Norwegian Radiation Protection Authority by GMS Abingdon Ltd and Eden Nuclear & Environment Ltd. 23 September.

PA DEP (Pennsylvania Department of Environmental Protection). 2016. TENORM Study Report, Rev. 1. May. Available at:
<https://www.dep.pa.gov/Business/Energy/OilandGasPrograms/OilandGasMgmt/Oil-and-Gas-Related-Topics/Pages/Radiation-Protection.aspx>.

Draft Division 50 rules
receiving comments
August 2023

**OAR CHAPTER 345 – OREGON ENERGY FACILITY SITING COUNCIL
RULES EFFECTIVE JAN. 1, 2022**

DIVISION 50 - RADIOACTIVE WASTE MATERIALS

<u>345-050-0006 - Disposal Prohibited</u>	<u>1</u>
<u>345-050-0010 - Purpose and Applicability.....</u>	<u>Error! Bookmark not defined.2</u>
<u>345-050-0020 - Exempt Quantities.....</u>	<u>32</u>
<u>345-050-0025 - Exempt Concentrations.....</u>	<u>Error! Bookmark not defined.2</u>
<u>345-050-0030 - Specific Exemptions.....</u>	<u>333</u>

**OAR CHAPTER 345 – OREGON ENERGY FACILITY SITING COUNCIL
RULES EFFECTIVE JAN. 1, 2022**

DIVISION 50 - RADIOACTIVE WASTE MATERIALS

345-050-0006 - Disposal Prohibited

~~Except (1) As provided under ORS 469.525, no radioactive waste shall be disposed of within this state, no person may arrange for disposal of radioactive waste within this state, no person may transport radioactive waste for disposal in this state and no waste disposal facility for any radioactive waste shall be established, operated or licensed within this state, except as provided in ORS chapter 469.525 and this division, a person shall not hold or place discarded or unwanted radioactive material for more than seven days at any geographical site in Oregon except.~~

345-050-0010xx - Purpose and Applicability

(1) Because virtually all materials contain some radioactivity, the purpose of the rules in ~~this division~~ [OAR 345-050-0006 through 345-050-0039](#) is to identify those materials that present such small health hazards that they are ~~exempt from the provisions of ORS 469.525~~ [not considered to be radioactive waste](#) and may be disposed of within the state.

(2) ~~The rules in this division~~ [OAR 345-050-0040 through 345-050-0130](#) establish standards for the siting of facilities for disposal of [radioactive](#) wastes that were generated before June 1, 1981, through industrial or manufacturing processes and that contain naturally occurring radioactive isotopes. These rules implement the requirements of ORS 469.375, 469.470 and 469.501 to 469.559 for such waste disposal facilities.

(3) Except as provided in OAR 345-050-0060, these rules do not apply to uranium mine overburden or uranium mill tailings, mill wastes or mill by-product material that are subject to OAR chapter 345, divisions 92 and 95.

~~4) In accordance with ORS 469.525, the Department may establish an enforceable timeline or other requirements to determine whether a material is radioactive waste.~~

(5) ~~For the site at which the purposes of this rule, disposal does not include:~~

~~(a) Temporary storage and staging of radioactive material waswaste used or generated according to a license under ORS 453.635 as part of regular site operations or a site of a thermal power plant used for the temporary storage of radioactive material from that plant for which the Council issued a site certificate;~~

~~(b) Temporary storage of radioactive waste at the Trojan Spent Fuel Storage Installation, subject to the provisions of OAR 345-026-0300 through 345-026-0390~~

Commented [WM*O1]: Note, this section moved from below

**ORAR CHAPTER 345 – OREGON ENERGY FACILITY SITING COUNCIL
RULES EFFECTIVE JAN. 1, 2022**

(c) Temporary storage of radioactive waste from a reactor for which a site certificate has been issued pursuant to this chapter that is operated by a college, university or graduate center for research purposes and is not connected to the Northwest Power Grid; and

(d) Temporary storage of ~~other~~ radioactive waste at a facility not licensed under ORS 453.635 pending lawful disposal out of this state, subject to the following:

(i) Any person that intends to temporarily store radioactive waste- must report to the Department and Oregon Health Authority within 10 business days of discovery of such waste. The Department, in consultation with Oregon Health Authority, must determine that temporary storage of radioactive waste presents no significant risk to health and safety of the public and workforce. obtain a determination and authorization from the Oregon Health Authority that sufficient systems, structures, and processes are in place to ensure the radioactive waste will can be safely handled and stored pending lawful disposal and that facility staff are informed of best practices; In order to determine that a radioactive waste presents no significant risk during temporary storage, it must be demonstrated that:

1A) the waste will be located in an area of a facility that is reasonably expected to be inaccessible to the public,

2B) the waste will be clearly marked and cordoned or otherwise isolated from workers, and must be stored in such a manner that minimizes risk of mobilization;

3C) workers will be informed and instructed on safety related to the waste;

4D) any other requirements as determined by the Department in consultation with Oregon Health Authority and the holder of the waste.

(ii) Temporary storage may not exceed 90 days without prior written authorization from the Department. To grant authorization to temporarily store radioactive waste for more than 90 days, the Department, in ~~consultation~~ collaboration with Oregon Health Authority, ~~must~~ determine that the radioactive waste presents no significant risk to public health and safety during storage and must be assured that the waste will be properly disposed as soon as reasonably achievable, not to exceed 180 days in total.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525

345-050-00XX – Radioactive Waste Determination Process and Schedule

If through process knowledge, radiation screening, or waste characterization data, or other means a person discovers that a material at a facility not licensed under ORS 453.635 is likely known or suspected to be radioactive waste, that person must report to the Department and the Oregon Health Authority as soon as possible, but within 10 business days. In accordance with ORS 469.525, The Department may

**OAR CHAPTER 345 – OREGON ENERGY FACILITY SITING COUNCIL
RULES EFFECTIVE JAN. 1, 2022**

~~establish an enforceable timeline or other requirements to determine whether the material is radioactive waste.~~

345-050-00205 - Exempt Concentrations

(1) Materials ~~are exempt from the provisions of ORS 469.525 provided that such materials contain radioactive materials/radionuclides~~ in concentrations ~~not below the applicable concentration identified in excess of those of Table 1.~~ **are not radioactive waste for** purposes of ORS 469.525 and these rules.

(2) Radium-bearing materials containing less than 5 picocuries of radium-226 per gram of solid, regardless of quantity.

(3) Thorium-bearing materials containing less than 20 picocuries of radium-228 per gram of solid, if the radium-228 is present with the parent thorium-232, regardless of quantity.

(4) Lead-210-bearing wastes which are not in equilibrium with uranium-238, are the result of fossil fuel-related production including refining, transport, or storage, and contain less than 10 picocuries per gram of solid regardless of quantity.

Commented [WM*02]: Note, this was previously -0025

Commented [ST*03]: Not new language, moved from "specific exemptions" for ease of use

345-050-00250 - Exempt Quantities

(1) Materials ~~are exempt from provisions of ORS 469.525 if such material that contain radioactive material/radionuclides~~ in individual quantities ~~none of which exceeds that do not exceed~~ the applicable quantity ~~set forth identified in Table 2~~ **are not radioactive waste for the purposes of ORS 469.525 and these rules unless** the number of individual quantities ~~does not exceed radionuclides at their maximum allowable activity given in Table 2 exceeds 10.~~

(2) Burial of a human body containing radioactive materials used for diagnostic or therapeutic purposes is exempt from the provisions of ORS 469.525 if the burial is otherwise done in accordance with applicable Oregon law.

(3) Radium-bearing material containing a total radium-226 activity of less than 10 microcuries, regardless of concentration.

(4) Thorium-bearing materials containing a total radium-228 activity of less than 100 microcuries, if the radium-228 is present with the parent thorium-232, regardless of concentration in the solid.

Commented [WM*04]: Exemption for human body moved to 'specific exemption' below

Commented [ST*05]: Not new language, moved from "specific exemptions" for ease of use

[ED. NOTE: The Table referenced in this rule is not printed in the OAR Compilation. Copies are available from the agency.]

345-050-0030 - Specific Exemptions

In addition to the exemptions under OAR 345-050-0020 and 345-050-0025, the following materials are exempt from the provisions of ~~rule~~ ORS 469.525 and OAR 345-050-0006:

**OAR CHAPTER 345 – OREGON ENERGY FACILITY SITING COUNCIL
RULES EFFECTIVE JAN. 1, 2022**

(1) Radioactive material ~~excluding NORM materials~~, that has been incorporated into a consumer product manufactured under a license issued by the Nuclear Regulatory Commission (NRC) or by an Agreement State, if the NRC or the Agreement State that issued the license has determined that the possession, use, transfer and disposal of such consumer product are exempt from regulatory requirements. An "Agreement State" is a state to which the NRC has delegated its authority to license and regulate byproduct materials (radioisotopes), source materials (uranium and thorium) and certain quantities of special nuclear materials in accordance with section 274b of the Atomic Energy Act.

~~(2) Radium-bearing materials containing less than 5 picocuries of radium-226 per gram of solid, regardless of quantity.~~

~~(3) Radium-bearing material containing a total radium-226 activity of less than 10 microcuries, regardless of concentration.~~

~~(4) Thorium-bearing materials containing less than 20 picocuries of radium-228 per gram of solid, if the radium-228 is present with the parent thorium-232, regardless of quantity.~~

~~(5) Thorium-bearing materials containing a total radium-228 activity of less than 100 microcuries, if the radium-228 is present with the parent thorium-232, regardless of concentration in the solid.~~

~~(6)~~

(2) Medical, industrial and research laboratory wastes contained in small, sealed, discrete containers in which the radioactive material is dissolved or dispersed in an organic solvent or biological fluid for the purpose of liquid scintillation counting and experimental animal carcasses that are disposed of or treated at a hazardous waste disposal facility licensed by the U.S. Environmental Protection Agency (U.S. EPA), by the Oregon Department of Environmental Quality, or by another state delegated the responsibility to regulate the disposal or treatment of hazardous waste by the U.S. EPA.

~~(23) Burial of a human body containing radioactive materials used for diagnostic or therapeutic purposes is exempt from the provisions of ORS 469.525 if the burial is otherwise done in accordance with applicable Oregon law.~~

~~(7) Wastes generated before June 1, 1981, through industrial or manufacturing processes that contain only naturally occurring radioactive isotopes, if such wastes are disposed of at a facility for which the Council has issued a site certificate in accordance with ORS 469.375 and OAR 345-050-0040 through 345-050-0130.~~

~~(8) Maintenance of radioactive coal ash at the site of a thermal power plant for which the Council has issued a site certificate.~~

~~(9)(34) Waste that an Oregon Health Authority assessment affirms results from the metabolism of isotopes used in medical treatment which only contain isotopes that will decay to activities below Table 2 limits within XX90? days. Exemption requires Oregon Health Authority determination as to the waste~~

Commented [ST*06]: Not new, moved from "exempt quantities" for ease of use

**OAR CHAPTER 345 – OREGON ENERGY FACILITY SITING COUNCIL
RULES EFFECTIVE JAN. 1, 2022**

composition and activity and conclusion that the material presents no significant risk to the public, workers, or the environment.

OR

(4) Waste that a facility-specific plan reviewed by in consultation with is identified as the result of metabolized isotopes used in medical treatment. A facility may only dispose of such waste in accordance with a facility-specific plan approved by the Department in consultation with Oregon Health Authority. The plan must ensure that the material presents no significant risk to the public, workers, or the environment. The plan, at a minimum, should include:

- (a) how the facility will identify and confirm that waste is the result of metabolized isotopes used in medical treatment;
- (b) information regarding worker safety and training;
- (c) how the facility will manage waste that is determined to not be the result of metabolized isotopes used in medical treatment; and
- (d) a tracking and reporting schedule for informing the Department and Oregon Health Authority of actions taken under the plan.

(345) Wastes containing only naturally occurring radioactive isotopes other than those in the uranium and thorium decay series, as long as the isotopes exist in their naturally occurring isotopic concentrations.

(456) Wastes legally disposed before [DATE OF REVISION] provided the waste is not removed from the location of original disposal.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525

Commented [ST*07]: Alternate and preferred version

Attachment 4

Division 50 Rulemaking Advisory Committee

Organization and Representative

Association of Oregon Counties, Branden Pursinger

Confederated Tribes of the Umatilla Indian Reservation, Mason Murphy

Gilliam County, Commissioner Pat Shannon

League of Women Voters of Oregon, Shirley Weathers

Oregon Business and Industry, Sharla Moffett and Emily Caffrey

Oregon Department of Environmental Quality, Jamie Jones

Oregon Health Authority, Radiation Protection Services, Hillary Haskins

Oregon Metro, Kevin Six

Oregon Physicians for Social Responsibility, Damon Motz-Storey

Oregon Refuse and Recycling Association, Andrea Fogue and Andy Lombardo

Oregon State University, Dr. Steve Reese

Public/Unaffiliated, Dave Smith

Public/Unaffiliated, Wayne Lei

Waste Management, Jim Denson

Note: EFSC appointed the organizations named here to the RAC, and the organizations selected the people to represent their interests on the RAC.

Attachment 5

DIVISION 50 - RADIOACTIVE WASTE MATERIALS

345-050-0006 - Disposal Prohibited

As provided under ORS 469.525, no radioactive waste shall be disposed of within this state, no person may arrange for disposal of radioactive waste within this state, no person may transport radioactive waste for disposal in this state and no waste disposal facility for any radioactive waste shall be established, operated or licensed within this state, except ~~Except~~ as provided in ORS chapter 469.525 and this division, a person shall not hold or place discarded or unwanted radioactive material for more than seven days at any geographical site in Oregon except the site at which the radioactive material was used or generated according to a license under ORS 453.635 or a site of a thermal power plant used for the temporary storage of radioactive material from that plant for which the Council issued a site certificate.

Statutory/Other Authority: ORS 469.470
Statutes/Other Implemented: ORS 469.525

345-050-0010 - Purpose and Applicability

(1) Because virtually all materials contain some radioactivity, the purpose of the rules in OAR 345-050-0006 through 345-050-0039 ~~this division~~ is to identify those materials that present such small health hazards that they are ~~exempt from the provisions of ORS 469.525~~ not considered to be radioactive waste and may be disposed of within the state.

(2) OAR 345-050-0040 through 345-050-0130 ~~The rules in this division~~ establish standards for the siting of facilities for disposal of radioactive wastes that were generated before June 1, 1981, through industrial or manufacturing processes and that contain naturally occurring radioactive isotopes. These rules implement the requirements of ORS 469.375, 469.470 and 469.501 to 469.559 for such waste disposal facilities.

(3) Except as provided in OAR 345-050-0060, these rules do not apply to uranium mine overburden or uranium mill tailings, mill wastes or mill by-product material that are subject to OAR chapter 345, divisions 92 and 95.

(4) In accordance with ORS 469.525, the Department may establish an enforceable timeline or other requirements to determine whether a material is radioactive waste.

(5) For the purpose of these rules, disposal does not include:

(a) Temporary storage and staging of radioactive waste used or generated and stored or staged in accordance with a state license under ORS 453.635 as part of regular site operations

(b) Temporary storage of radioactive waste at the Trojan Spent Fuel Storage Installation until a federal waste repository is operational, subject to the provisions of OAR 345-026-0300 through 345-026-0390

(c) Temporary storage of radioactive waste from a reactor for which a site certificate has been issued pursuant to this chapter that is operated by a college, university or graduate center for research purposes and is not connected to the Northwest Power Grid; and

(d) Temporary storage of radioactive waste at a facility not licensed under ORS 453.635 pending lawful disposal out of this state, subject to the following:

(i) Any person that intends to temporarily store radioactive waste must report to the Department and Oregon Health Authority within 10 business days of discovery of such waste. The Department, in consultation with Oregon Health Authority, must determine that temporary storage of radioactive waste presents no significant risk to health and safety of the public and workforce. In order to determine that a radioactive waste presents no significant risk during temporary storage, it must be demonstrated that:

(A) the waste will be located in an area of a facility that is reasonably expected to be inaccessible to the public,

(B) the waste will be clearly marked and cordoned or otherwise isolated from workers, and must be stored in such a manner that minimizes risk of mobilization. This may include cover and/or secondary containment;

(C) workers will be informed and instructed on safety related to the waste;

(D) any other requirements as determined by the Department in consultation with Oregon Health Authority and the holder of the waste.

(ii) Temporary storage may not exceed 90 days without prior written authorization from the Department. To grant authorization to temporarily store radioactive waste for more than 90 days, the Department, in collaboration with Oregon Health Authority, must be assured that the waste will be properly disposed as soon as reasonably achievable, not to exceed 180 days in total.

Statutory/Other Authority: ORS 469.470

Statutes/Other Implemented: ORS 469.525

345-050-0020 - Exempt QuantitiesConcentrations

(1) Materials that contain radionuclides in concentrations below the applicable concentration identified in **Table 1** are not radioactive waste for purposes of ORS 469.525 and these rules. Additionally, wastes with the following characteristics are considered to contain exempt concentrations:

(2) Radium-bearing materials containing less than 5 picocuries of radium-226 per gram of solid, regardless of quantity,

(3) Thorium-bearing materials containing less than 20 picocuries of radium-228 per gram of solid, if the radium-228 is present with the parent thorium-232, regardless of quantity, or

(4) Lead-210-bearing wastes which are not in equilibrium with uranium-238, are the result of fossil fuel-related production including refining, transport, or storage, and contain less than 10 picocuries per gram of solid regardless of quantity.

(1) Materials are exempt from provisions of ORS 469.525 if such materials contain radioactive material in individual quantities none of which exceeds the applicable quantity set forth in **Table 2** and if the number of individual quantities does not exceed 10.

(2) Burial of a human body containing radioactive materials used for diagnostic or therapeutic purposes is exempt from the provisions of ORS 469.525 if the burial is otherwise done in accordance with applicable Oregon law.

[ED. NOTE: The Table referenced in this rule is not printed in the OAR Compilation. Copies are available from the agency.]

~~Statutory/Other Authority: ORS 469~~

~~Statutes/Other Implemented: ORS 469.300, ORS 469.470 & ORS 469.525~~

~~Statutory/Other Authority: ORS 469.470~~

~~Statutes/Other Implemented: ORS 469.300 & ORS 97.153~~

345-050-0025 - Exempt QuantitiesConcentrations

(1) Materials that contain radionuclides in individual quantities that do not exceed the applicable quantity identified in **Table 2** are not radioactive waste for the purposes of ORS 469.525 and these rules unless the number of individual radionuclides at their maximum allowable activity given in Table 2 exceeds 10. Additionally, wastes with the following characteristics are considered to contain exempt quantities:

(2) Radium-bearing material containing a total radium-226 activity of less than 10 microcuries, regardless of concentration.

(3) Thorium-bearing materials containing a total radium-228 activity of less than 100 microcuries, if the radium-228 is present with the parent thorium-232, regardless of concentration in the solid. ~~Materials are exempt from the provisions of ORS 469.525 provided that such materials contain radioactive materials in concentrations not in excess of those of **Table 1**.~~

[ED. NOTE: The Table referenced in this rule is not printed in the OAR Compilation. Copies are available from the agency.]

~~Statutory/Other Authority: ORS 469~~

~~Statutes/Other Implemented: ORS 469.300, ORS 469.470 & ORS 469.525~~

~~Statutory/Other Authority: ORS 469.470~~

~~Statutes/Other Implemented: ORS 469.300 & ORS 97.153~~

345-050-0030 - Specific Exemptions

In addition to the exemptions under OAR 345-050-0020 and 345-050-0025, the following materials are exempt from the provisions of ORS 469.525 and OAR rule 345-050-0006:

(1) Radioactive material that has been incorporated into a consumer product manufactured under a license issued by the Nuclear Regulatory Commission (NRC) or by an Agreement State, if the NRC or the Agreement State that issued the license has determined that the possession, use, transfer and disposal of such consumer product are exempt from regulatory requirements. An "Agreement State" is a state to which the NRC has delegated its authority to license and regulate byproduct materials (radioisotopes), source materials (uranium and thorium) and certain quantities of special nuclear materials in accordance with section 274b of the Atomic Energy Act.

~~(2) Radium-bearing materials containing less than 5 picocuries of radium-226 per gram of solid, regardless of quantity.~~

~~(3) Radium-bearing material containing a total radium-226 activity of less than 10 microcuries, regardless of concentration.~~

~~(4) Thorium-bearing materials containing less than 20 picocuries of radium-228 per gram of solid, if the radium-228 is present with the parent thorium-232, regardless of quantity.~~

~~(5) Thorium-bearing materials containing a total radium-228 activity of less than 100 microcuries, if the radium-228 is present with the parent thorium-232, regardless of concentration in the solid.~~

(62) Medical, industrial and research laboratory wastes contained in small, sealed, discrete containers in which the radioactive material is dissolved or dispersed in an organic solvent or biological fluid for the purpose of liquid scintillation counting and experimental animal carcasses that are disposed of or treated at a hazardous waste disposal facility licensed by the U.S. Environmental Protection Agency (U.S. EPA), by the Oregon Department of Environmental Quality, or by another state delegated the responsibility to regulate the disposal or treatment of hazardous waste by the U.S. EPA.

(3) Burial of a human or animal body containing radioactive materials used for diagnostic or therapeutic purposes is exempt from the provisions of ORS 469.525 if the burial is otherwise done in accordance with applicable Oregon law.

(4) Waste that is identified as the result of metabolized isotopes used in medical treatment. A facility may only dispose of such waste in accordance with a facility-specific plan approved by the Department in consultation with Oregon Health Authority. The plan must ensure that the material presents no significant risk to the public, workers, or the environment. The plan, at a minimum, should include:

(a) how the facility will identify and confirm that waste is the result of metabolized isotopes used in medical treatment;

(b) information regarding worker safety and training;

(c) how the facility will manage waste that is determined to not be the result of metabolized isotopes used in medical treatment; and

(d) a tracking and reporting schedule for informing the Department and Oregon Health Authority of actions taken under the plan.

~~(7) Wastes generated before June 1, 1981, through industrial or manufacturing processes that contain only naturally occurring radioactive isotopes, if such wastes are disposed of at a facility for which the Council has issued a site certificate in accordance with ORS 469.375 and OAR 345-050-0040 through 345-050-0130.~~

~~(8) Maintenance of radioactive coal ash at the site of a thermal power plant for which the Council has issued a site certificate.~~

(9~~5~~) Wastes containing only naturally occurring radioactive isotopes other than those in the uranium and thorium decay series, as long as the isotopes exist in their naturally occurring isotopic concentrations.

(6) Wastes legally disposed before [DATE OF REVISION] provided the waste is not removed from the location of original disposal.

Statutory/Other Authority: ORS 469.470

Statutes/Other Implemented: ORS 469.525