

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

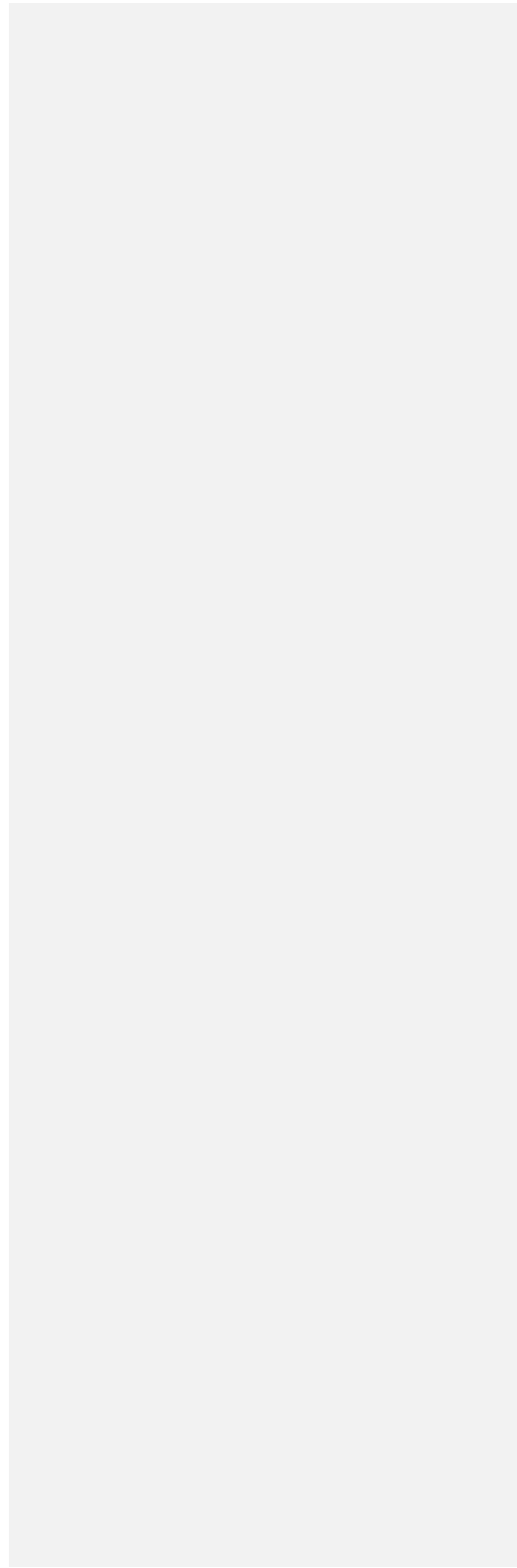
REVIEW COMMENT RECORD (RCR)**Document(s) Reviewed:**

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

OAD 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.~~

~~(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 [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

**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 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

**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