



RADIOACTIVE MATERIAL TRANSPORT IN OREGON: 2021-2022

Report to the
Oregon Legislature

by the
**OREGON
DEPARTMENT OF
ENERGY**



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DEPARTMENT OF
ENERGY

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EXECUTIVE SUMMARY

Oregon Revised Statute 469.609 requires the Oregon Department of Energy to submit an annual report to interested state and local government agencies on the transport of radioactive material in Oregon. In addition, ORS 469.617 requires the agency to prepare and submit to the Governor for transmittal to the Legislative Assembly, on or before the start of each odd-numbered year Legislative session, a comprehensive report on the transport of radioactive material in Oregon. This document fulfills both requirements and provides information on radioactive material transport in and through Oregon during calendar years 2021 and 2022.

The Radioactive Material Transport Program helps prevent accidents involving the transport of radioactive material. The program also prepares for responding to mishaps if they occur. The Oregon Department of Energy is the lead state agency for the program and works with other state and local agencies to carry out the program's mission.

During this report period, 365 shipments of radioactive materials entered or traveled in Oregon safely under authority of the state's Radioactive Material Transport Permit Program. The shipments that occur represent a wide range of materials and hazards.

There were no transport accidents in Oregon during 2021-2022 that resulted in spillage or injury from radioactive material.

This complete report is available online: <https://www.oregon.gov/energy/Data-and-Reports/Pages/Reports-to-the-Legislature.aspx>

TABLE OF CONTENTS

REGULATING RADIOACTIVE MATERIAL TRANSPORT..... 4

SHIPMENT ACTIVITY..... 5

SUMMARY OF TRANSPORT ACCIDENTS AND INCIDENTS 9

EMERGENCY PREPAREDNESS AND RESPONSE ACTIVITIES12

AN EVALUATION OF THE EFFECTIVENESS OF ENFORCEMENT ACTIVITIES AND THE DEGREE OF COMPLIANCE WITH APPLICABLE RULES12

A SUMMARY OF OUTSTANDING PROBLEMS CONFRONTING ODOE IN ADMINISTERING ORS 469.550, 469.563, 469.603 TO 469.619 AND 469.992.....12

RECOMMENDATION FOR ADDITIONAL LEGISLATION13

CONCLUSION.....13

APPENDIX A: PLACARDED RADIOACTIVE MATERIAL SHIPMENTS TRANSPORTED THROUGH OREGON – 1983 THROUGH 2022 14

REGULATING RADIOACTIVE MATERIAL TRANSPORT

The 1981 Legislature passed Oregon Revised Statutes 469.603 through 469.621 to regulate the transport of radioactive material. The law mandates effective emergency response to transport incidents, and Oregon statutes are consistent with federal safety standards.

Certain shipments of radioactive materials – depending on the radiation levels and if a carrier uses its vehicle to haul other materials – require information signs called placards. Placarding requirements are established by the U.S. Department of Transportation. Oregon statutes require carriers of all radioactive placarded shipments to obtain a state permit to transport through Oregon. The Oregon Department of Energy is the permitting authority but is authorized to and delegates this authority to the Oregon Department of Transportation.

The Oregon Department of Transportation, ODOT, operates the state's ports-of-entry; therefore, it can effectively track compliance with permitting regulations. The Oregon Department of Energy charges permit holders a fee for each placarded shipment that travels through the state. The charge is \$70 for most shipments and \$500 annually for some medical and industrial shipments. The fees go primarily toward training first responders and other emergency personnel along the state's transport corridors.

During this reporting period, ODOT issued 79 permits for radioactive material shipments.

Additionally, the statutes require the Oregon Department of Energy to:

- Work with appropriate agencies of government at the local, state, and national levels to ensure a swift and appropriate response to any accident.
- Work with the Oregon Health Authority to conduct adequate training and emergency planning along the transport routes.

The statutes also require the Oregon Health Authority to maintain a trained and equipped radiation emergency response team.

The Oregon Energy Facility Siting Council develops rules to implement the statutes, providing rulemaking authority to:

1. **Set requirements for notification; record keeping; packaging; and emergency response.** Transporters must notify the State of certain radioactive material shipments; of any vehicle accidents; loss of any radioactive material; or tampering with or obstruction of any shipments.
2. **Specify conditions of transport for certain classes of radioactive materials.** Motor vehicles must avoid transport during a road condition advisory unless vehicles have the required traction tires or devices. If the Oregon Department of Energy director believes there is clear and immediate danger to public health or safety, the director may halt a shipment of radioactive material. The director may also impose civil penalties for violation of rules.
3. **Establish requirements for insurance, bonding, or other indemnification.** Carriers must maintain a certain amount of insurance, pay for costs associated with response to an

accident, and indemnify the state from claims arising from the release of radioactive material during transport.

Special note: During this report period, ODOE conducted an internal audit of our internal processes to evaluate the overall program to include data collection. This audit showed that we needed to update the online Trip Report that is utilized to gather specific information from the trucking companies, carriers, of the radioactive materials in Oregon. An ODOE IT specialist, working with ODOT, changed the route report form to gather this additional data.

SHIPMENT ACTIVITY

Carriers transport radioactive materials in Oregon daily, including small amounts for industry and medical use. They also routinely transport industrial gauges with radioactive sources to work sites throughout the state. Because of the small amount of radioactivity involved, many of these shipments do not require placards.

Appendix A shows the number of placarded radioactive material shipments transported through Oregon from 1982 to 2022.

Currently, commercial nuclear facilities near the Hanford nuclear site in southeast Washington make up a significant number of the radioactive material shipments through Oregon. For example, Uranium Hexafluoride, UF-6, a product that is used in the nuclear energy industry to make new reactor fuel, accounts for approximately 30 percent of Oregon's radioactive material shipments total annually. During this reporting period, this trend did not change.

Previously, Hanford was responsible for the majority of shipments through Oregon. For more than 40 years, the federal government produced plutonium at Hanford for nuclear weapons. That process created huge amounts of waste. Since 1989, Hanford has been the site of the world's largest environmental cleanup. Some Hanford waste has already been transported through Oregon to disposal facilities in other states. Eventually many more such shipments will occur.

While most of the current shipments in Oregon pose a low risk, some do present unique hazards.

Low-level Radioactive Waste

Perma-Fix Northwest, a commercial facility in Richland, Washington, treats low-level radioactive waste from around the nation, using thermal treatment, size reduction, and compaction. Perma-Fix then returns the treated waste to the sender or sends it on to a disposal site.

US Ecology, a commercial disposal site at Hanford, disposes of low-level waste sent from hospitals, nuclear power plants, industries, and universities in 11 Western and Rocky Mountain states, including Oregon. US Ecology disposes of wastes by burying it in trenches. The volume of

RADIOACTIVE MATERIAL TRANSPORT IN OREGON: 2021-2022

waste now shipped to the US Ecology site is significantly less than volumes disposed in the 1980s and early 1990s.

U.S. Department of Energy nuclear weapon production and research sites throughout the country previously shipped low-level waste to government-owned burial trenches at Hanford. In 1999, US DOE selected Hanford as one of two sites (the other is in Nevada) to receive significant amounts of the nation's low-level and mixed low-level waste. The US DOE decision could have resulted in thousands of shipments over the next several decades. However, litigation prevented US DOE from shipping these wastes to Hanford. A separate litigation settlement extended the moratorium on most waste shipments to Hanford into at least the mid-2030s.

Commercial Nuclear Fuel Fabrication

The Framatome facility (formerly known as AREVA) in Richland, Washington fabricates fuel for use in commercial nuclear reactors. Trucks carrying raw materials for that use travel through Northeast Oregon. The new reactor fuel travels through Oregon as well.

Transuranic Waste

US DOE buries a type of radioactive material called "transuranic" at the Waste Isolation Pilot Plant, WIPP, in southeast New Mexico. Transuranic waste includes lab equipment, protective clothing, tools, rubble, soil, and sludge tainted with small amounts of plutonium and other radioactive materials.

A release of radioactive material in New Mexico from WIPP in February 2014 contaminated portions of the facility and led to a halt in shipments. Waste disposal resumed in early 2017.



Transuranic waste retrieval (2004).

From July 2000 through August 2011, Hanford made 572 transuranic waste shipments to WIPP. An additional 77 shipments of transuranic waste traveled from Hanford through Oregon to the Idaho National Laboratory for repackaging.

From 2003 through 2011 (other than 2009, when no transuranic shipments were made from Hanford), WIPP shipments represented a significant percentage of the radioactive material that traversed the state. Oregon's agreement with the US DOE restricts WIPP shipments through Oregon to Interstates 82 and 84 in Northeast Oregon.

While WIPP resumed disposal operations in 2017, Hanford waste is not expected to ship again anytime soon. Due to other cleanup priorities at Hanford, new transuranic waste shipments to WIPP are not anticipated until 2028. Once the shipments resume, DOE expects that transuranic waste, TRU waste, shipments from Hanford will occur at significantly higher numbers. For the

RADIOACTIVE MATERIAL TRANSPORT IN OREGON: 2021-2022

past several years, TRU waste has been packaged and stored safely on the Hanford Site awaiting authorization to be shipped to WIPP.

The State of Washington is currently negotiating with the US DOE to resume TRU shipments. Oregon is monitoring those discussions and we will be involved with the transportation planning process to ensure those shipments will be safely moved through Oregon.

A recent Hanford document projected as many as 6,250 transuranic shipments remain at the site. Many of these shipments will have much higher levels of radioactivity than the waste that was previously shipped through the state; however, ODOE is confident that these shipments can occur safely thanks to the agency's experience overseeing this program and its close coordination with US DOE.

Oregon is an involved participant with other western states and US DOE, through the Western Interstate Energy Board, WIPP Transportation Technical Advisory Group, and the National Transportation Stakeholders Forum.

The program includes:

- Higher standards for the drivers and trucking companies.
- A “defect-free” standard for inspections.
- Procedures to keep the trucks off the road when road or weather conditions are especially hazardous.
- Training of first responders and hospital emergency room personnel along the shipping routes.
- Advance notice of shipments provided to the states.
- Near real-time tracking of the shipments, using a satellite tracking system.

US DOE has agreed to the “above-regulatory” protocols for certain other shipments as well. ODOE and its partners including other state agencies, Oregon State University, and local governments and first response agencies along the shipping routes remain ready to implement the comprehensive transport safety program upon resumption of shipments from Hanford to WIPP in New Mexico.

Naval Nuclear Reactor Compartment Shipments

Since 1986, the U.S. Navy has disposed of 133 reactor compartments at Hanford from deactivated nuclear submarines and cruisers. The Navy removes the irradiated nuclear fuel from the reactors, cuts out a section of the submarine or cruiser containing the reactor compartment, and welds steel plates over any opening to seal the compartments. The Navy conducts this work at the Puget Sound Naval Shipyard and Intermediate Maintenance Facility in Bremerton, Washington. The Navy then sends those compartments, classified as low-level waste, by barge down the Washington coastline and then up the Columbia River to Hanford.

RADIOACTIVE MATERIAL TRANSPORT IN OREGON: 2021-2022

Through most of the 1990s and into the early part of the 2000s, the Navy averaged between seven and ten shipments a year. Currently, the average number of shipments is between zero



A decommissioned submarine reactor at the Puget Sound Naval Shipyard in Bremerton, WA (2022).

and two per year. The Navy made one shipment in 2021 and two shipments in 2022.

The Oregon Health Authority's Radiation Protection Services and the Washington Department of Health occasionally inspect these shipments, prior to departure, to ensure they meet state and federal transport regulations. Oregon officials were invited to conduct an inspection of shipment in the fall of 2022 before the barges left dock at the Puget Sound Naval Shipyard in Bremerton, Washington.

Rail Shipments

The Navy periodically ships irradiated nuclear fuel from its warships by rail from Puget Sound Naval Shipyard to the Idaho National Laboratory. These rail shipments travel through about 200 miles of northeast Oregon. The Oregon Department of Energy works with the Navy to provide information about these shipments to state and local emergency responders. Because these are considered national security shipments, the Navy does not share shipment schedules with the state.

Spent Nuclear Fuel and High-level Waste

There is no national repository for spent nuclear fuel or high-level radioactive waste. After many years with no effort to establish such a facility, in 2021 the US DOE started a process to design what it terms a *consent-based siting* approach to establishing a national repository. This process will take many years to conclude, and many more years before a facility might be located and constructed.

Portland General Electric stores 791 irradiated, or spent, nuclear fuel assemblies in 34 large concrete and steel canisters at the former Trojan nuclear plant site northwest of Portland. Energy Northwest stores spent nuclear fuel at the Columbia Generating Station nuclear power plant near Richland, Washington. DOE also stores spent nuclear fuel at Hanford and eventually will have immobilized high-level nuclear waste in temporary storage.

RADIOACTIVE MATERIAL TRANSPORT IN OREGON: 2021-2022

Should DOE be successful in opening a national repository storage facility, the initial spent fuel could come from shutdown nuclear reactors such as Trojan. The Oregon Department of Energy will be involved with extensive planning and training before these materials are transported through Oregon, regardless of the destination.

It is anticipated that when Trojan's spent fuel is removed it will likely be moved by rail due to the weight of the specialized containers that will be used to safely move this fuel to another location. In 2022 ODOT rail safety staff conducted a site inspection of the Trojan site to help complete the state's pre-plan for de-inventorying the Trojan site by rail.



Trojan Nuclear Plant spent fuel casks.

SUMMARY OF TRANSPORT ACCIDENTS AND INCIDENTS

There were no transportation incidents in Oregon during the period of January 1, 2021 through December 31, 2022 that resulted in spillage or injury from radioactive material.

Radiation Protection Services (RPS) received and responded to 113 incidents reported during the two-year period. These reports range from informational notifications to requests for a physical response by the department's radioactive materials program personnel.

Of the total incident reports, **46** (41%) were classified as transportation incidents. A breakdown of the major categories is given below:

Twenty-six incidents of radiation alarms at three Oregon metal scrap dealers for gondolas (open top type of rolling rail stock) and/or trucks carrying scrap metal originating from in-state and out-of-state locations. Of the 26:

- **22** contained low-level radioactive materials and were returned to their point of origin under US DOT special permit. Five of these returns were to other states. (Four to Washington, one to Idaho).
- **2** contained low-level radioactive materials but left the scrap metal site and returned to their sites of origin before a US Department of Transportation (US DOT) special permit could be issued.
- **1** contained a shielded, industrial gauge containing a radioactive sealed source (cesium-137) received from a Utah metals scrap site. The Oregon metal scrap dealer, an RPS radioactive materials licensee, was unaware that lost/recovered devices with sources must be reported to RPS upon discovery and placed it in locked storage for disposal by a radioactive materials waste broker that visits the site periodically to identify, package and ship low-level radioactive materials to the low-level radioactive waste site operated by US Ecology in Richland, Washington. Nine months later, the waste broker discovered the gauge and reported it to RPS. RPS personnel responded and found the gauge intact

RADIOACTIVE MATERIAL TRANSPORT IN OREGON: 2021-2022

and determined the gauge owner (defunct mining company in Nevada) from the gauge serial number and manufacturer. RPS reported the recovered gauge to the U.S. Nuclear Regulatory Commission. The scrap dealer arranged for, and disposal was made through, the gauge manufacturer.

- **1** contained a device containing a radioactive source (radium-226) received from a Lane County metals recycling transfer station with elevated radiation readings of 44 mrem/hour. The public limit for dose rate is 2 mrem/hour. The trailer was sent to the county landfill (Short Mountain) and isolated. This was done without issuance of a US DOT special permit. Landfill personnel notified the State regional hazardous materials team (HAZMAT 3) out of Eugene, Civilian Support Team 102nd (CST 102nd) out of Salem, and RPS out of Portland. ODOE was also notified. HAZMAT 3 located the device in the trailer, CST 102nd identified the source as radium, retrieved and isolated the device, and RPS confirmed the source identification and dose rate, ensured device was isolated with barriers established, and discussed disposal options with landfill personnel. Disposal out of state was subsequently made through a radioactive materials waste broker.

Fifteen incidents of radiation waste alarms at waste transfer stations in Oregon. These facilities receive municipal solid waste from both commercial and residential sources. Of the 15:

- **11** alarms from the Portland Metro South and Metro Central waste transfer stations for incoming waste trucks. These alarms involved low-level, short-lived radioactive medical waste, ten of which were returned to their point of origin (hospitals) under US DOT special permit with the eleventh decayed-in-storage at Metro since both Metro stations hold a radioactive materials license from RPS to do so.
- **2** alarms were for higher activity radioactive sources found in separate waste loads on separate dates. RPS personnel responded to both events and determined the sources to be radium-226 as follows:
 - o One used for medical cancer therapy in the 1930s-40s
 - o An industrial radon generator device.

Both were placed into secure storage at Metro until disposal out of state was made through a radioactive materials waste broker.

- **2** alarms at the Columbia Ridge Regional Landfill near Arlington operated by Waste Management. This site is permitted to receive municipal solid waste as well as Title 40 (EPA) hazardous waste for processing and disposal.
 - o One involved short-lived radioactive medical waste (iodine-131) that was nearly decayed to background and allowed to decay on site for four days and subsequently disposed at the landfill.
 - o The other involved industrial waste (residual thorium-232 in chloride waste) that was sent back to its point of origin in Oregon under US DOT special permit.

One incident involved a Yellow-II shipping package in transit to a hospital containing a shielded, high-activity, radioactive sealed source (iridium-192) used in a High Doserate (HDR) device for medical brachytherapy (cancer therapy). The package was delivered by common carrier to the

RADIOACTIVE MATERIAL TRANSPORT IN OREGON: 2021-2022

hospital but to the wrong office on a different floor (4th floor Oregon Oncology Specialists instead of 1st floor Radiation Oncology) that accepted the package. The package was placed in a secure room where four office personnel work and no attempts were made to contact the Radiation Oncology office or personnel listed on the package. The discrepancy was not discovered until six days later when the source vendor contacted Radiation Oncology to schedule installation of the new source received. Radiation Oncology personnel searched and found the package, still sealed in its shielded container. Because the package was in a room with non-radiation workers, therapy personnel performed a dose assessment for them and submitted this to RPS. Total whole-body dose for persons nearest the package was determined to be 10 millirem, or, 1/10 of the annual public dose limit of 100 millirem above background radiation levels. The event was reported by RPS to the US NRC and forwarded by them to the US DOT for investigation of the common carrier involved.

One incident involved a White-I shipping package containing a shielded, short-lived radiopharmaceutical (iodine-123m) used for medical diagnostic studies that fell off the back of a common carrier during transit with several other non-hazardous packages. The undamaged package was found by a passerby (member of the public) who contacted the hospital telephone number listed on the package shipping document. Hospital personnel responded and retrieved the package. RPS personnel determined the passerby did not receive a measurable radiation dose from the shielded, low-level radioactive White-I package. The event was reported to the US NRC and subsequently forwarded by them to the US DOT for investigation of the common carrier involved.

One incident involved discovery of five small containers of uranium-238 metal by agents of the federal Department of Homeland Security and the Federal Bureau of Investigation during a search for Weapons of Mass Destruction at an international shipping company's site in Portland. The uranium was prepared for shipping to Australia by a U.S. company outside Oregon and sent to the Portland site to ship the material overseas. RPS personnel responded and found the shipment to be authorized by the US NRC. RPS turned over all information to the US NRC for further investigation of the U.S. company that shipped the material.

One incident involved a request from a regional hazardous materials transfer station to identify a radioactive source brought to them by a member of the public. RPS personnel responded and identified the material as magnesium-thorium (mag-thor) alloy. The low-level radioactive thorium-232 was determined to be exempt from RPS regulation at less than 0.04 percent by weight. RPS discussed disposal options with the citizen.

One incident involved a request for assistance made to RPS by an Oregon regional waste transfer station that received two packages wrapped in lead foil brought from a local high school containing radioactive material. RPS personnel responded and determined the material to be low-level radioactive solid uranium compounds and naturally occurring radioactive material. The material is being held by the high school until RPS can arrange retrieval of the material through the Oregon Department of Environmental Quality's (DEQ's) hazardous chemical removal program for schools.

EMERGENCY PREPAREDNESS AND RESPONSE ACTIVITIES

The Oregon Department of Energy contracts with RPS to provide radiological training to first responders and hospital emergency room personnel. RPS provides basic and advanced radiation emergency response courses and serves as subject matter experts for Oregon's law enforcement, fire service, hazardous materials response teams, and private industry.

RPS's health physicist staff train monthly to respond to and mitigate a transportation, accidental, or intentional radiological contamination event. RPS personnel are trained to provide unified command and control using the National Incident Management System's Incident Command System. This structure allows RPS to integrate response with other public safety organizations. Approximately 48 hours are dedicated to training for response operations per year.

RPS also collaborates with the Oregon National Guard's 102nd Civil Support Team in a joint effort to enhance radiological surveying and response capabilities by developing and delivering coordinated training to first responders and first receivers.

In addition, the Oregon Department of Energy contracts with Oregon State University's Radiation Center to annually provide advanced training in radiological response to members of Oregon's Regional Hazmat Teams. State police Troopers and emergency responders from other state, federal, and local agencies also participate in this training. This training at OSU occurred in 2021 and will be scheduled again in spring 2023.

AN EVALUATION OF THE EFFECTIVENESS OF ENFORCEMENT ACTIVITIES AND THE DEGREE OF COMPLIANCE WITH APPLICABLE RULES

Since the establishment of its program, Oregon has experienced few compliance problems regarding the state's regulation of radioactive material transport. The carriers meet state standards, apply for and carry state permits, and pay their fees.

ODOE believes that Inspections both within the state and nationally have shown that trucks carrying radioactive materials are, on average, better maintained than trucks carrying other hazardous materials. ODOE believes this difference is the result of the special attention paid to radioactive material shipments.

A SUMMARY OF OUTSTANDING PROBLEMS CONFRONTING THE OREGON DEPARTMENT OF ENERGY IN ADMINISTERING ORS 469.550, 469.563, 469.603 TO 469.619 AND 469.992

The Department notes no outstanding problems in administering ORS 469.550, 469.563, 469.603 to 619, or 469.992. ORS 469.992 allows the Director of the Oregon Department of Energy or the Energy Facility Siting Council to impose civil penalties for violations of statutes, rules, site certificates, and other Department-issued orders.

RADIOACTIVE MATERIAL TRANSPORT IN OREGON: 2021-2022

The Energy Facility Siting Council has adopted rules governing the procedures for assessing and issuing violations and enforcement penalties at OAR 345, Division 29. In 2021, EFSC updated these rules.

ODOE has conducted an internal audit of its program to ensure that fees charged to transporters of radioactive material are appropriate to cover program expenditures. The internal audit has shown that fees for radioactive shipments should be reviewed and reconsidered, particularly as the fees have not been changed in over 30 years. The review process and potential fee increase will be conducted as a rulemaking project by EFSC, expected to begin in 2023 or early 2024.

RECOMMENDATION FOR ADDITIONAL LEGISLATION

ORS 469.617(4) requires that the legislative report include any “recommendations for additional legislation as the Energy Facility Siting Council considers necessary and appropriate.” Neither EFSC nor ODOE are making recommendations for legislation at this time.

CONCLUSION

Carriers safely transported 365 placarded shipments of radioactive materials through Oregon during 2021 and 2022. RPS provided comprehensive emergency preparedness training upon request. There were no serious shipment accidents or violations.

RADIOACTIVE MATERIAL TRANSPORT IN OREGON: 2021-2022

APPENDIX A: PLACARDED RADIOACTIVE MATERIAL SHIPMENTS TRANSPORTED THROUGH OREGON – 1983 THROUGH 2022

Year	# Shipments	Year	# Shipments
1983	1,928	2003	385
1984	973	2004	324
1985	1,250	2005	300
1986	690	2006	345
1987	653	2007	438
1988	588	2008	509
1989	629	2009	421
1990	551	2010	518
1991	876	2011	570
1992	664	2012	466
1993	447	2013	554
1994	369	2014	408
1995	628	2015	371
1996	290	2016	366
1997	304	2017	312
1998	444	2018	263
1999	459	2019	267
2000	724	2020	356
2001	410	2021	256
2022	211	2022	109
Total Shipments Since Beginning of Oregon Radioactive Material Permit Program: 20,626			

FOR MORE INFORMATION

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