



# Role of Low-Level Waste Consumption and Recovery of Resources in Nuclear Fuel

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## DESCRIPTION

Low-level waste (LLW), Low-Level Radioactive Waste (LLRW), Spent Nuclear Fuel (SNF), Transuranic Waste (TRU), or some by-product materials known as 11e(2) wastes, such as uranium mill tailings, are all examples of radioactive waste that do not fit into the categorical definitions for other types of radioactive waste. LLW is the category of radioactive wastes that does not fit into the other categories, and it is defined by exclusion. Items that have been exposed to neutron radiation or been contaminated with radioactive substances are included in LLW. The radioactivity can range from just above background levels found in nature to very highly radioactive in certain cases such as parts from inside the reactor vessel in a nuclear power plant.

The risks of low-level waste depend on the level of radioactivity and the exposure time. Low-level waste can contain long-lasting, deadly radioactive elements that can pose high doses and risk to people and the environment if not properly managed. Low-level waste can also contaminate soil, water, plants and animals if it leaks or spills from storage or disposal facilities. Low-level waste can also pose a security threat if it falls into the wrong hands and is used for malicious purposes. Therefore, low-level waste requires careful handling, transport, storage and disposal to minimize the potential harm to human health and the environment.

The amount of low-level waste produced in the US varies by year and by source. According to the Environmental Protection Agency (EPA), the total generation of Municipal Solid Waste (MSW) in 2018 was 292.4 million tons, of which some portion may be considered low-level waste. However, MSW does not include other sources of low-level waste, such as construction and demolition debris, municipal wastewater sludge, and other non-hazardous industrial wastes. According to the NRC, low-level waste can be generated by any industry using radioactive material, including government, utility, manufacture, medical and research facilities. The amount of low-level waste disposed of at these facilities may vary depending on the availability, capacity, and regulations of each site.

Some examples of low-level radioactive waste are:

- Contaminated protective clothing, shoe covers, gloves, masks, etc. that are used by workers in nuclear facilities or medical institutions.
- Wiping rags, mops, filters, paper towels, etc. that are used to clean up radioactive spills or leaks.
- Medical tubes, syringes, needles, swabs, etc. that are used for diagnosis or treatment of patients with radioactive materials.
- Laboratory animal carcasses and tissues that are exposed to radioactive materials for research purposes.
- Equipment and tools that are used in nuclear reactors, nuclear fuel cycle facilities, or nuclear weapons production and decommissioning.
- Luminous dials, gauges, signs, etc. that contain radioactive materials such as tritium or radium.

The most common type of radioactive waste, accounting for about 83% of the total volume of radioactive waste generated worldwide. Zero waste conserves resources in low level waste by reducing the amount of waste that is generated, reused, recycled or composted. This reduces the need for extracting and processing new raw materials, which saves energy, water, land and other natural resources. It also reduces the amount of waste that is disposed of in landfills or incinerators, which reduces greenhouse gas emissions, pollution and environmental degradation. It promotes a circular economy, where materials are used and reused instead of being discarded after one use. This creates value from waste and supports local industries.

## CONCLUSION

Therefore, its proper management and disposal is essential to reduce the overall environmental and health impacts of radioactive waste. It contains long-lasting radioactive elements that can pose risks to human health and the environment if not properly handled, transported, stored and disposed of. Low-level waste can also contaminate soil, water, plants and animals if it leaks or spills from storage or disposal facilities. It can provide benefits to various sectors of society, such as medicine, industry,

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**Received:** 28-Apr-2023, Manuscript No. IJWR-23-21451; **Editor assigned:** 01-May-2023, PreQC No. IJWR-23-21451 (PQ); **Reviewed:** 15-May-2023, QC No. IJWR-23-21451; **Revised:** 22-May-2023, Manuscript No. IJWR-23-21451 (R); **Published:** 29-May-2023, DOI: 10.35248/2252-5211.23.13.531.

**Citation:** Sanchez M (2023) Role of Low-Level Waste Consumption and Recovery of Resources in Nuclear Fuel. Int J Waste Resour. 13:531.

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research and energy. It can be used as a source of radiation for sterilization, diagnosis, treatment, quality control, measurement, calibration and research purposes. It can also be recycled or

reused in some cases, such as metal recycling or reuse of sealed sources.