

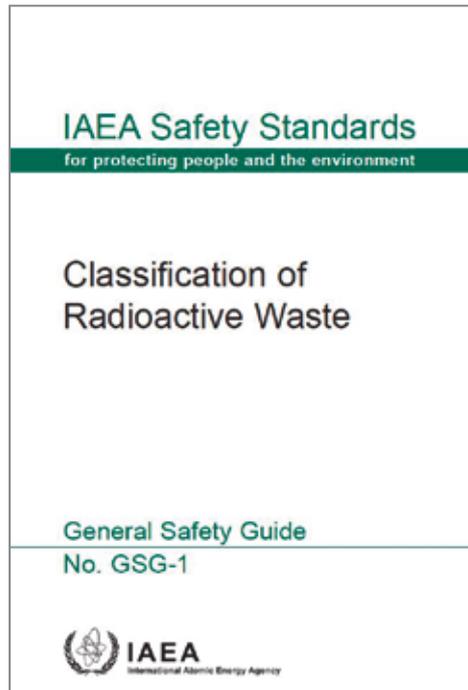
WHAT IS RADIOACTIVE WASTE?

Radiation and radioactive substances are found naturally in the environment and can also be man-made. They have a range of beneficial applications, from generating power to uses in medicine, industry and agriculture. These activities lead to radioactive waste in various gaseous, liquid and solid forms. The waste is radioactive because the atoms in the waste are unstable and spontaneously release ionizing radiation during the transformation process towards becoming stable. This ionizing radiation can have potentially harmful effects. Therefore, it is important to safely manage the waste in order to protect people and the environment, and help prevent waste from becoming a burden on future generations.

Radioactive waste arises from the generation of electricity in nuclear power plants, as well as from nuclear fuel cycle operations such as fuel manufacture and other activities in the nuclear fuel cycle, like mining and processing of uranium and thorium ores. In some countries, spent nuclear fuel is declared as radioactive waste, as no further use is foreseen. In other countries, spent nuclear fuel is a resource intended for reprocessing. Reprocessing will itself generate highly radioactive, heat-generating waste, which is typically conditioned in a glass matrix, in addition to other types of radioactive waste such as the metal cladding that is removed from the fuel elements before treatment.

Radioactive waste also comes from a wide range of activities in industry, medicine, research and development, and agriculture. The majority of this type of waste consists of disused sealed radioactive sources. Sealed sources are used in various applications, for example high activity cobalt sources used in cancer treatment. They contain radioactive material permanently sealed in a capsule. Sources are declared as radioactive waste if they are no longer used or no longer fit for their original purpose. Radioactive waste also comes from activities and processes where naturally occurring radioactive material becomes concentrated in waste material. One such example is depleted uranium, a by-product of fuel fabrication, which can also be declared waste when no further use is foreseen.

The decommissioning of nuclear facilities and the cleanup of contaminated sites also generates radioactive waste which has to be managed and ultimately disposed of. These



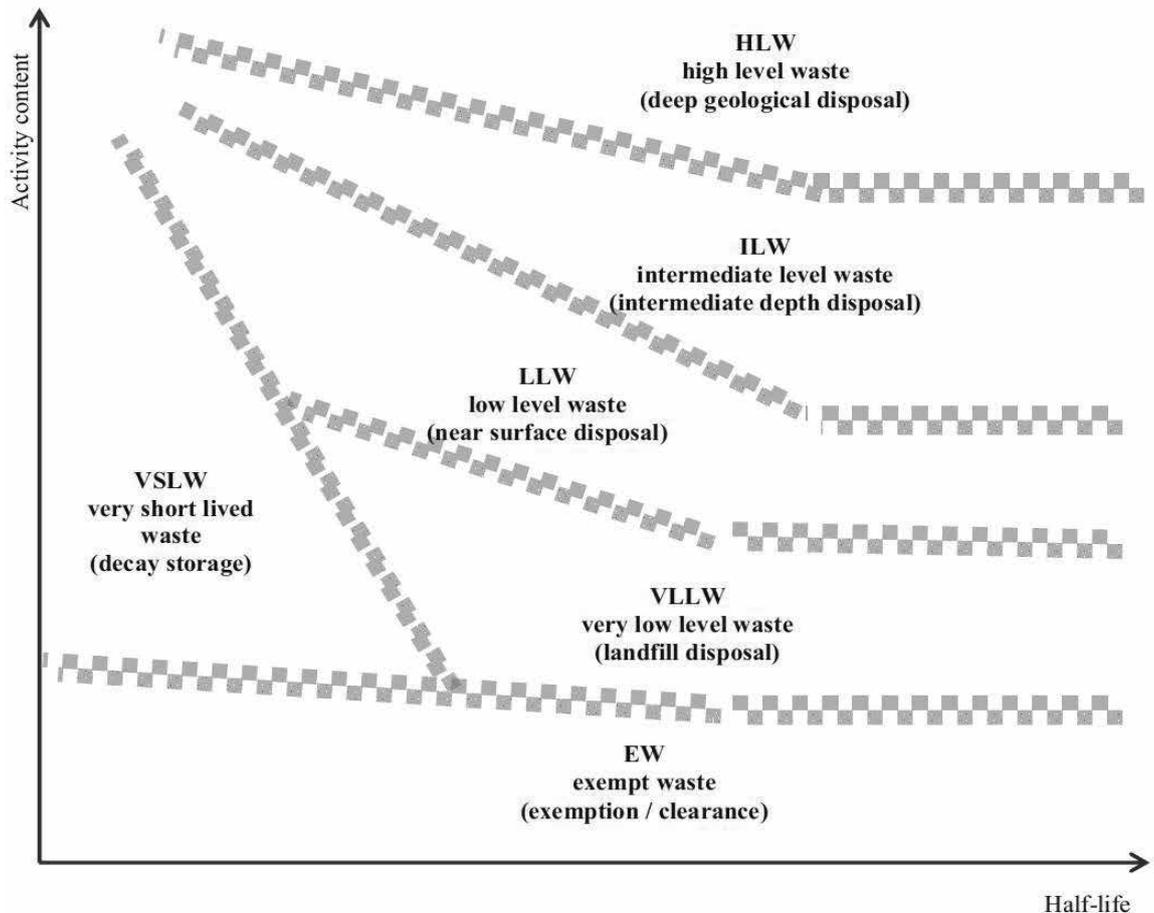
The IAEA contributes to the development of safety standards with the aim of facilitating the appropriate management of radioactive waste. Among these is a Safety Guide with general standards for classifying radioactive waste: *Classification of Radioactive Waste*.

activities use many different techniques to minimize the volume of radioactive waste but still generate varying quantities of structural materials like concrete and metal items. Site remediation inevitably leads to the removal of contaminated soil.

The radiation risks to workers, to the public and to the environment that may arise from radioactive waste have to be assessed and, if necessary, controlled. The properties of radioactive waste vary, not only in terms of radioactive content and activity concentration but also in terms of physical and chemical properties. A common characteristic of all radioactive waste is its potential to present a hazard to people and to the environment. The potential hazards can range from trivial to significant.

To reduce any associated risks of these hazards to acceptable levels, radioactive waste management and disposal options must account for the varying characteristics and properties of radioactive waste, as well as the range of potential hazards. It must also account for the entire chain of radioactive waste handling, from the point of waste generation to disposal. This includes processing waste streams to produce stable and solid waste forms that are reduced in volume and immobilized as far as practicable, and placing them in containers in order to facilitate storage, transport and disposal. In some cases, radioactive waste may also present a security

IAEA Waste Classification System, 2009



threat, which must be accounted for and mitigated appropriately in managing the waste.

To ensure appropriate handling, the IAEA establishes safety standards for radioactive waste management that include guides for classifying radioactive waste according to physical, chemical and radiological properties. These standards facilitate the use of appropriate management approaches and the selection of safe radioactive waste disposal facilities.

The IAEA establishes safety standards with the aim of facilitating the appropriate management of radioactive waste. Among these is a Safety Guide with general standards for classifying radioactive waste: *Classification of Radioactive Waste* (Safety Standards Series No. GSG-1). This classification system primarily focuses on long term safety, which requires appropriate disposal and management approaches that address different types of waste. It defines six classes of waste: exempt waste (EW), very short lived waste (VSLW), very low level waste (VLLW),

low level waste (LLW), intermediate level waste (ILW) and high level waste (HLW).

The VLLW, LLW, ILW and HLW classes are safely and sustainably managed through disposal. These classifications link the different classes of waste to disposal options that are, in principle, suitable. It must be demonstrated that the disposal of a specific type of waste in a particular disposal facility is suitable.

IAEA Division of Radiation, Transport and Waste Safety and IAEA Division of Nuclear Fuel Cycle and Waste Technology