1. RATIONALE

Spent fuel is generated only by countries operating nuclear power plants or research reactors, whereas radioactive waste is generated in all countries producing or using radioactive material in, for example, the nuclear fuel cycle, medicine, industry and research. Radioactive waste comprises various forms and materials, with different radioactivity levels and half-lives. Acceptable disposal routes depend on the level of radioactivity and established preferences and practices in different countries. Some waste contains such low levels of radioactivity that it can be released from regulatory control and disposed of as non-radioactive waste. However, for radioactive waste that presents a long-term risk to people and the environment, its endpoint is placement in an appropriate package and disposal in a suitably engineered, and licensed facility.

This publication provides an overview of current global inventories of spent fuel and radioactive waste, current arrangements for their management, and future plans for their ultimate disposal, where appropriate. The publication is one of the outcomes of the ‘Status & Trends’ project, undertaken by the IAEA in collaboration with the European Commission and the OECD-Nuclear Energy Agency. The aim of the project is to prepare a Status and Trends report at regular intervals. The report is intended to serve as a comprehensive and authoritative reference of the world-wide situation, consistent with the information presented in the reports provided under the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management and the EU Directive 2011/70/Euratom.

2. OBJECTIVE

The report provides an analysis of the current status and forward trends in spent fuel and radioactive waste management, and includes information on current inventories, expected future arisings and estimation of facilities for the long-term management of these materials. The report is intended to serve as a comprehensive and authoritative reference on the world-wide situation, consistent with the information presented in the reports provided under the Joint Convention and EC Directive.

The information provided in this publication is based primarily on the data submitted by each of the participating Member States to the Spent Fuel and Radioactive Waste Information System and data presented in the reports to the Seventh Review Meeting of the Contracting Parties to the Joint Convention (held in 2022, with all relevant data as at December 2019). It includes an analysis of national arrangements and programmes for spent fuel and radioactive waste management. International achievements and challenges are also addressed.

The first publication ‘Status and Trends in Spent Fuel and Radioactive Waste Management’ was published by the IAEA in January 2018 with the reference date 31st December 2013. The second one in January 2022 with the reference date 31st December 2016. The intent is to publish new report every 3 years, in line with the reporting schedule for the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

SCOPE

The report addresses the following:

- Radioactive waste (solid and liquid) that has been so designated in the relevant national classification system, by the owner and/or the State and is in a physical form such that it should be reported under the Joint Convention. This includes:
  - the national equivalents to the IAEA classes of VLLW, LLW, ILW and HLW, as well as any miscellaneous unclassified radioactive waste (e.g. disused sources when specified separately; waste from small producers), if this is included in the relevant national waste inventory; and
  - spent nuclear fuel which has been permanently removed from an operational reactor core (whether or not it is considered to be radioactive waste), including fuel that is currently in storage pending further management or that has previously been reprocessed.

The following types of radioactive materials are specifically excluded:

- Exempt waste that meets the criteria for clearance, exemption or exclusion from regulatory control for radiation protection purposes, e.g. as per IAEA Safety Standard GSG-1;
- Very short-lived waste (e.g. since this is typically held for decay, then released);
- Authorized effluent releases;
Radioactive materials and products that have not been declared radioactive waste;

Radioactive waste from extractive industries (e.g. uranium mining, NORM) if they have not been included in the relevant national inventory;

Waste from military/defence activities if they have not been included in the relevant national inventory; and

Contaminated sites and related buildings, when these are not included in the relevant national inventory. Note that “contaminated sites” includes both industrially contaminated and those contaminated by large accidents (e.g. Chernobyl, Fukushima). Radioactive waste generated from the clean-up of such sites shall be included in the inventory at the time such waste is generated.

The report includes the radioactive waste and spent fuel that has been or will be produced or managed by the following types of existing and planned facilities and activities:

- NPPs, research and other reactors, fuel cycle facilities, radioactive waste processing facilities, industrial facilities, medical and research facilities, which produce spent nuclear fuel or radioactive waste as defined above;
- Facilities currently undergoing or planned to undergo decommissioning which will result in the creation of radioactive waste as defined above;
- Radioactive waste and spent fuel storage facilities (e.g. spent fuel pools, dry storage facilities for spent fuel, solid waste storage facilities and storage tanks for liquid wastes, whether in operation or filled / closed);
- Radioactive waste disposal facilities (including both operating facilities and filled or closed, historic facilities);
- Past or non-typical practices (e.g. sea dumping, deep borehole injection);
- Contaminated sites which will undergo environmental remediation;
- Other facilities or waste sources included in national radioactive waste management programmes.

Liquid and gaseous wastes in short-term storage prior to authorized discharge should not be reported.