ANNEX

The information in Tables A–1 to A–15 is based on the National Profiles and reports to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. The Tables reflect information and data as provided by each participating Member State. The views expressed do not necessarily reflect those of the IAEA. The use of particular designations of countries or territories does not imply any judgement by the IAEA as to the legal status of such countries or territories, of their authorities and institutions or of the delimitation of their boundaries.

TABLE A–1. STATUS OF THE JOINT CONVENTION ON THE SAFETY OF SPENT FUEL MANAGEMENT AND ON THE SAFETY OF RADIOACTIVE WASTE MANAGEMENT (AS OF 8 FEBRUARY 2016)

Country/Organization	**Signature**	**Instrument**	**Date of deposit**	**Entry into force**
Albania		Accession	29 Jun 2011	27 Sep 2011
Argentina	19 Dec 1997	Ratification	14 Nov 2000	18 Jun 2001
Armenia		Accession	22 May 2013	20 Aug 2013
Australia	13 Nov 1998	Ratification	05 Aug 2003	03 Nov 2003
Austria	17 Sept 1998	Ratification	13 Jun 2001	11 Sep 2001
Belarus	13 Oct 1999	Ratification	26 Nov 2002	24 Feb 2003
Belgium	08 Dec 1997	Ratification	05 Sep 2002	04 Dec 2002
Bosnia and Herzegovina		Accession	02 Aug 2012	31 Oct 2012
Botswana		Accession	14 Aug 2015	12 Nov 2015
Brazil	31 Oct 1997	Ratification	17 Feb 2006	18 May 2006
Bulgaria	22 Sep 1998	Ratification	21 Jun 2000	18 Jun 2001
Canada	07 May 1998	Ratification	07 May 1998	18 Jun 2001
Chile		Accession	26 Sep 2011	25 Dec 2011
China		Accession	13 Sep 2006	12 Dec 2006
Croatia	09 Apr 1998	Ratification	10 May 1999	18 Jun 2001
Cyprus		Accession	21 Oct 2009	19 Jan 2010
Czech Republic	30 Sep 1997	Approval	25 May 1999	18 Jun 2001
Denmark	09 Feb 1998	Acceptance	03 Sep 1999	18 Jun 2001
Estonia	05 Jan 2001	Ratification	03 Feb 2006	04 May 2006
Finland	02 Oct 1997	Acceptance	10 Feb 2000	18 Jun 2001
France	29 Sep 1997	Approval	27 Apr 2000	18 Jun 2001
Gabon		Accession	29 Apr 2010	28 Jul 2010
Georgia		Accession	22 Jul 2009	20 Oct 2009
Germany	01 Oct 1997	Ratification	13 Oct 1998	18 Jun 2001
Ghana		Accession	01 Jun 2011	30 Aug 2011
Greece	09 Feb 1998	Ratification	18 Jul 2000	18 Jun 2001
Hungary	29 Sep 1997	Ratification	02 Jun 1998	18 Jun 2001

Country/Organization	Signature	Instrument	Date of deposit	Entry into force
Iceland		Accession	27 Jan 2006	27 Apr 2006
Indonesia	06 Oct 1997	Ratification	01 Apr 2011	30 Jun 2011
Ireland	01 Oct 1997	Ratification	20 Mar 2001	18 Jun 2001
Italy	26 Jan 1998	Ratification	08 Feb 2006	09 May 2006
Japan		Accession	26 Aug 2003	24 Nov 2003
Jordan		Accession	15 Apr 2016	14 Jul 2016
Kazakhstan	29 Sep 1997	Ratification	10 Mar 2010	08 Jun 2010
Korea, Republic of	29 Sep 1997	Ratification	16 Sep 2002	15 Dec 2002
Kyrgyzstan		Accession	18 Dec 2006	18 Mar 2007
Latvia	27 Mar 2000	Acceptance	27 Mar 2000	18 Jun 2001
Lebanon	30 Sep 1997			
Lithuania	30 Sep 1997	Ratification	16 Mar 2004	14 Jun 2004
Luxembourg	01 Oct 1997	Ratification	21 Aug 2001	19 Nov 2001
Malta		Accession	16 Sep 2013	15 Dec 2013
Mauritania		Accession	19 Sep 2011	18 Dec 2011
Mauritius		Accession	15 Apr 2013	14 Jul 2013
Montenegro		Accession	09 Aug 2010	07 Nov 2010
Morocco	29 Sep 1997	Ratification	23 Jul 1999	18 Jun 2001
Netherlands	10 Mar 1999	Acceptance	26 Apr 2000	18 Jun 2001
Nigeria		Accession	04 Apr 2007	03 Jul 2007
Norway	29 Sep 1997	Ratification	12 Jan 1998	18 Jun 2001
Oman		Accession	28 May 2013	26 Aug 2013
Peru	04 Jun 1998	Ratification	08 Feb 2016	08 May 2016
Philippines	10 Mar 1998			
Poland	03 Oct 1997	Ratification	05 May 2000	18 Jun 2001
Portugal		Accession	15 May 2009	13 Aug 2009
Republic of Moldova		Accession	23 Feb 2010	24 May 2010
Romania	30 Sep 1997	Ratification	06 Sep 1999	18 Jun 2001
Russian Federation	27 Jan 1999	Ratification	19 Jan 2006	19 Apr 2006
Saudi Arabia		Accession	19 Sep 2011	18 Dec 2011

Country/Organization	Signature	Instrument	Date of deposit	Entry into force
Senegal		Accession	24 Dec 2008	24 Mar 2009
Slovakia	30 Sep 1997	Ratification	06 Oct 1998	18 Jun 2001
Slovenia	29 Sep 1997	Ratification	25 Feb 1999	18 Jun 2001
South Africa		Accession	15 Nov 2006	13 Feb 2007
Spain	30 Jun 1998	Ratification	11 May 1999	18 Jun 2001
Sweden	29 Sep 1997	Ratification	29 Jul 1999	18 Jun 2001
Switzerland	29 Sep 1997	Ratification	05 Apr 2000	18 Jun 2001
Tajikistan		Accession	12 Dec 2007	11 Mar 2008
The former Yugoslav Republic of Macedonia		Accession	31 Dec 2009	31 Mar 2010
Ukraine	29 Sep 1997	Ratification	24 Jul 2000	18 Jun 2001
United Arab Emirates		Accession	31 Jul 2009	29 Oct 2009
United Kingdom	29 Sep 1997	Ratification	12 Mar 2001	18 Jun 2001
United States of America	29 Sep 1997	Ratification	15 Apr 2003	14 Jul 2003
Uruguay		Accession	28 Dec 2005	28 Mar 2006
Uzbekistan		Accession	19 Jan 2009	19 Apr 2009
Viet Nam		Accession	09 Oct 2013	07 Jan 2014
EURATOM		Accession	04 Oct 2005	02 Jan 2006

TABLE A–2. NATURE AND ROLE OF THE WASTE MANAGEMENT ORGANIZATION (AS OF 31 DECEMBER 2013)

Country	Waste Management Organisation (WMO)	Responsibilities	Ownership
Albania	Institute of Applied Nuclear Physics	Management and storage of and radioactive waste	State
Argentina	CNEA	Management of radioactive waste	State
Armenia	No specified WMO		
Australia	ANSTO	Management of radioactive waste	State
Azerbaijan	Specialized Enterprise 'Isotope'	Management of radioactive waste	State
Belgium	ONDRAF/NIRAS	Development and operation of disposal facilities for all types of radioactive waste and spent fuel.	State
Bosnia and Herzegovina	No specified WMO		
Bulgaria	State Enterprise Radioactive Wastes (SE RAW)	Management of radioactive waste	State
Canada	NWMO	Development and operation of disposal facility for spent fuel	Utility
	Low Level Radioactive Waste Management Office (LLRWMO)	Cleanup and management of Canada's historic waste.	State/Private
China	No specified WMO		
Croatia	No specified WMO		
Cyprus	No specified WMO		
Czech Republic	SÚRAO	Development and operation of radioactive waste and spent fuel storage and disposal facilities	State
Denmark	Danish Decommissioning	Management of all radioactive waste	State
Estonia	A.L.A.R.A. Ltd.	Management of all radioactive waste	State
Finland	Posiva Oy	Development and operation of disposal facility for spent fuel. Low level waste disposal is the direct responsibility of the NPPs.	Utilities
France	ANDRA	Development and operation of disposal facilities for all types of radioactive waste.	State
Georgia	Department for Radioactive Waste Management	Management of radioactive waste	State

Country	Waste Management Organisation (WMO)	Responsibilities	Ownership
Germany	BfS	Development and operation of disposal facilities for all types of radioactive waste and spent fuel.	State
Hungary	PURAM	Development and operation of storage and disposal facilities for all types of radioactive waste and spent fuel and decommissioning of nuclear facilities.	State
Indonesia	BATAN	Management of spent fuel and radioactive waste	State
Iran, Islamic Republic of	No specified WMO		
Ireland	No specified WMO		
Italy	SOGIN	Decommissioning of nuclear facilities and management of radioactive waste	Public
Japan	NUMO	Development and operation of disposal facility for HLW	State
Korea, Republic of	KORAD	Development and operation of storage and disposal facilities for all types of radioactive waste and spent fuel, and management of radioactive waste management fund	State
Latvia	State Ltd 'Latvian Environment, Geology and Meteorology Centre'	Management of all radioactive waste	State
Lithuania	RATA	Management of RAW and transportation to Ignalina NPP for treatment, storage and disposal.	State
Luxembourg	No specified WMO		
Malaysia	Nuclear Malaysia	Management of radioactive waste	State
Mexico	ININ	Management of radioactive waste	State
Morocco	CNESTEN	Management of radioactive waste	State
Poland	RWMP	Management of radioactive waste and spent fuel	State
Portugal	IST	Management of radioactive waste	State
Republic of Moldova	RWSF	Storage of radioactive waste	State
Romania	ANDR	Development and operation of disposal facilities for all types of radioactive waste and spent fuel.	State

Country	Waste Management Organisation (WMO)	Responsibilities	Ownership
Russian Federation	NO RAO	Development and operation of disposal facilities all types of radioactive waste. Predisposal management is distributed among several organisations as FSUE RosRAO, Moscow Radon, etc.)	State
Slovakia	JAVYS	Development and operation of storage and disposal facilities for all types of radioactive waste and spent fuel, operation of centralised waste processing facilities, and decommissioning of nuclear facilities.	State
Slovenia	Agency for Radwaste Management	Development and operation of storage and disposal facilities for all types of radioactive waste and spent fuel.	State
South Africa	NRDWI	Management of radioactive waste and spent fuel.	State
Spain	ENRESA	Development and operation of storage and disposal facilities for all types of radioactive waste and spent fuel. Decommissioning of reactors.	State
Sweden	SKB	Development and operation of storage and disposal facilities for all types of radioactive waste and spent fuel.	Utilities
Turkey	CNAEM	Management of radioactive waste	State
Ukraine	SA Radon	Management of radioactive waste	State
United Kingdom	NDA	Overseeing strategic management of radioactive waste and spent fuel including waste from historic operations	State
United States of America	DOE	Development and operation of disposal facilities for all spent fuel, certain ILW (greater than class C LLW), and DOE owned or generated radioactive waste.	State
	States/Compacts	Responsible for disposal of LLW (disposal occurs at commercially operated facilities)	
Viet Nam	No specified WMO		

TABLE A–3. FINANCING SCHEMES AND FUNDING MECHANISMS FOR SPENT FUEL AND RADIOACTIVE WASTE

Country	Funding of RWM	Funding of SF and HLW management	Funding of decommissioning
Argentina	Producers pay for RWM, which means State.	Producers pay for RWM, which means State.	Owner (State) is responsible for providing the resources required for the safe decommissioning of the nuclear power plant.
Armenia	Producers pay for RWM in case of waste from NPP, governmental funding for other institutional waste	Facility funding	Decommissioning fund
Australia	Governmental funding	Governmental funding	Governmental funding
Austria	Producers pay for RWM, part of it goes to special fund, which is supposed to cover the final disposal	Governmental funding	Governmental funding
Belarus		NPP shall create the fund	NPP shall create the nuclear decommissioning fund
Belgium	Producer pays contribution to long-term fund	'Long term' fund by licence holders	Each site responsible
Bosnia and Herzegovina	Governmental funding	N/A	Governmental funding
Brazil	Governmental funding	Governmental funding	Governmental funding
Bulgaria	Payments to Radioactive Waste Fund	Operators payments to Radioactive Waste Fund and international contributors	Operators payments to Nuclear Facilities Decommissioning Fund and international contributors
Canada	Each licensee must create its fund	Each licensee must create its fund	Each licensee must create its fund
Chile	Producers pay for RWM	Governmental funding	Governmental funding
China		Collection of the funds into a dedicated account based the electricity production.	
Croatia	Producers pay disposal fee to 'Fund for Financing the Decommissioning of the Krsko Nuclear Power Plant and the Disposal of Radioactive Waste and Spent Nuclear Fuel'	The 'Fund for Financing the Decommissioning of the Krsko Nuclear Power Plant and the Disposal of Radioactive Waste and Spent Nuclear Fuel'	The 'Fund for Financing the Decommissioning of the Krsko Nuclear Power Plant and the Disposal of Radioactive Waste and Spent Nuclear Fuel'
Cyprus	Producers pay for RWM	N/A	N/A
Czech Republic	Producers pay for RWM	Specific fund by licence holders held by Government	Licence holders must make provisions

Country	Funding of RWM	Funding of SF and HLW management	Funding of decommissioning
Denmark	Producers pay for RWM	The state carries the financial liability	Governmental funding
Estonia	Producers pay for RWM	The state carries the financial liability	Governmental funding
Finland	Producers pay for RWM	Nuclear Waste Management Fund	Nuclear Waste Management Fund
France	Producers pay for RWM, partly government funded.	Specific funds set aside by NPP operators. Other facilities partly government funded.	Specific funds set aside by NPP operators. Other facilities partly government funded
Georgia	Producers pay for RWM. In case of legacy waste founded by state.	Provided by waste producer. In case of legacy waste founded by state.	Governmental funding
Germany	Private facilities setting aside provisions. State owned facilities financed by public funds. Small waste producers pay fees to the Land collecting facilities.	Private facilities setting aside provisions. State owned facilities financed by public funds.	Private facilities setting aside provisions. State owned facilities financed by public funds.
Greece	Producers pay for RWM	Governmental funding	Governmental funding
Hungary	Central Nuclear Financial Fund	Central Nuclear Financial Fund	Central Nuclear Financial Fund
Iceland	Producers pay for RWM	N/A	N/A
Indonesia	Producers pay for RWM	Producers responsibility	Producers responsibility
Ireland	Producers pay for RWM	N/A	N/A
Italy	Producers pay for RWM	Partly funds set aside by NPP, but due to early shut down, these are insufficient. Additionally levy on electricity	Levy on electricity
Japan	Producers pay for RWM	Electrical utilities establish a fund	Electrical utilities establish a fund
Kazakhstan		Governmental funding and international donors	Governmental funding and international donors
Korea, Republic of	Producers pay for RWM	Radioactive Waste Management Fund operated by Government (KORAD)	Radioactive Waste Management Fund operated by Government
Latvia	Producers pay for RW predisposal management, State pays for disposal	N/A	Governmental funding and donors
Lithuania	Producers pay for RWM	Funds provided by NPP, State and international	Funds provided by NPP, State and

Country	Funding of RWM	Funding of SF and HLW management	Funding of decommissioning
		contributors	international contributors
Luxembourg	Producers pay for RWM	N/A	N/A
Malaysia	Producers pay for RWM	Producers responsibility	Producers responsibility
Malta		N/A	N/A
Mexico	Producers pay for RWM, governmental funding	Governmental funding	Governmental funding
Montenegro		N/A	N/A
Netherlands	Producers pay for RWM	Producers fund the processing and long term management	Financial Guarantee to fund future decommissioning and resulting waste management costs
Nigeria	Producers pay for RWM	N/A	N/A
Norway	Producers pay for RWM	Producers responsibility	Producers pay, partly governmental funding
Oman	Producers pay for RWM	N/A	N/A
Poland	Producers pay for RWM	Decommissioning fund or State budget (in case of the research reactor)	Decommissioning fund or State budget (in case of the research reactor)
Portugal	Producers pay for RWM	Producers responsibility	Producers responsibility
Republic of Moldova	Producers pay for RWM	N/A	N/A
Romania	Producers pay for RWM	Producer has to pay fee to Radioactive Waste Management Funds	Producer has to pay fee to Decommissioning Fund or State Budget (in case of the research reactor)
Russian Federation	Since 11 July 2011 the producer has to pay to special reserve fund, previous waste management is responsibility of the state.	The law requires a fund contributed to by operators and government for storage and research	The law requires a fund contributed to by operators and government for decommissioning
Slovakia	National Nuclear Fund, in case of management of waste of unknown origin, otherwise waste producer is responsible, disposal of RW is financed National Nuclear Fund paid by operators and State	Storage and disposal of HLW and SF is paid by National Nuclear Fund paid by operators and the State	National Nuclear Fund paid into by operators and State; in case of NPP V-1 contributes also EU.
Slovenia	Producers pay for RWM	Fund raised by NPP operators (Slovenia and Croatia)	Fund paid by NPP operators (Slovenia and Croatia). Slovenian funding through Fund for Decommissioning of Krško Nuclear Power Plant and the disposal of radioactive waste from Krško Nuclear Power Plant.

Country	Funding of RWM	Funding of SF and HLW management	Funding of decommissioning
South Africa	Currently: Producers pay for RWM, in Long Term: Owners contribute to National Radioactive Waste Management Fund to be established	Currently: Producers pay for RWM, in Long Term: Waste producers contribute to National Radioactive Waste Management Fund to be established	Owners/Waste producers pay
Spain	Producers pay for RWM	Fund from NPP operators and payments for waste management services	Fund from NPP operators and payments for waste management services
Sweden	Disposal of operational waste paid directly by the operators	Nuclear Waste Fund —collected as a fee on nuclear power production	Nuclear Waste Fund included in the fee for SF and decommissioning
Switzerland	Producers pay for RWM	Waste Disposal Fund set up in 2000	Decommissioning Fund set up in 1984
Ukraine		Governmental funding	Governmental funding
United Kingdom		Operational waste management including low level waste disposal is paid for by the operators. Future disposal of spent fuel and other waste will be paid for by the Government with a contribution from a levy on nuclear electricity production.	Governmental funding for Decommissioning costs for the NDA estate. Decommissioning costs for the currently existing AGR and PWR reactors will be met through the Nuclear Liabilities Fund.
United States of America	Producers pay for RWM	Private operators of facilities must demonstrate capability to fund operational waste management. Public facilities obtain government funding. For spent fuel and HLW disposal operators have paid into a Nuclear Waste Fund (currently suspended)	Private operators of facilities must demonstrate capability to fund decommissioning. Public facilities obtain government funding.
Viet Nam	Currently: Producers pay for RWM, in Long Term: Owners contribute to National Radioactive Waste Management Fund to be established	Currently: Waste producers pay fee for RWM, in Long Term: Waste producers contribute to National Radioactive Waste Management Fund to be established	Decommissioning Fund from fee on the nuclear energy

TABLE A–4. SUMMARY OF WASTE CLASSIFICATION SYSTEMS

<table>
<tr><th>COUNTRY
[REFERENCE]</th><th>CLASSIFICATION SYSTEM</th></tr>
<tr><td>Argentina
[A-1]</td><td>Uses the IAEA classification system (see below).</td></tr>
<tr><td>Australia
[A–2]</td><td>Uses the IAEA classification system (see below).

All jurisdictions have indicated their intention to adopt the scheme, During this transition period some jurisdictions may use the previous Australian system which as described in the Code of Practice for the Near Surface Disposal of Radioactive Waste in Australia (RHS No. 35, 2002, currently under review).</td></tr>
<tr><td>Austria
[A–3]</td><td>Naturally Occurring Radioactive Materials (NORM): defined as radioactive waste if the exposure to the general public would exceed 1 mSv/a.

Transition radioactive waste: Type of radioactive waste (mainly from medical origin) which will decay within the period of temporary storage and may then be suitable for management outside of the regulatory control system subject to compliance with clearance levels. (Waste in the transition phase, e.g. short-lived decay waste from medical applications containing ^{125}I, is put into decay storage prior to free release).

Low and intermediate level waste (LILW): In LILW, the concentration of radionuclides is such that generation of thermal power during its disposal is sufficiently low. These acceptable thermal power values are site specific following safety assessments.

- Short-lived waste (LILW-SL): This category includes radioactive waste with nuclides half-life less than or equal to those of ^{137}Cs and ^{90}Sr (around 30 years) with a restricted alpha long lived radionuclide concentration (limitation of long lived alpha emitting radio nuclides to 4000 Bq/g in individual waste packages and to an overall average of 400 Bq/g in the total waste volume).
- Long lived waste (LILW-LL): Long lived radionuclides and alpha emitters whose concentration exceeds the limits for short-lived waste.

High level waste does not arise in Austria.</td></tr>
<tr><td>Belgium
[A–4]</td><td>Category A waste is the one in which the radionuclides are present in specific activities low enough and half-lives short enough to be compatible with surface disposal, in compliance with the generic limits of 400 to 4 000 Bq/g of long lived alpha activity according to the recommendations of the IAEA and the European Union, and in compliance with the specific limits for the critical radionuclides as determined by the safety assessments for a specific facility on a specific site.

Category B waste is waste that does not meet the radiological criterion for belonging to category A, but does not generate enough heat to be category C.

Category C waste or high level waste (IAEA classification) contains very high quantities of alpha and beta emitters that generate significant heat. It must, therefore, cool down during a period of interim storage (currently foreseen period of 60 years), and its residual thermal power at the time of the disposal requires either limiting the number of packages per metre of disposal gallery, or increasing the distance between the galleries, or increasing the time during which such wastes are to cool down in aboveground purpose built facilities.

<table><tr><th></th><th>Low activity</th><th>Medium Activity</th><th>High Activity</th></tr><tr><td>Short-lived waste</td><td>A</td><td>A</td><td>C</td></tr><tr><td>Long lived waste</td><td>B</td><td>B</td><td>C</td></tr></table>
The above waste categories are further subdivided in waste classes and waste streams.

Spent fuel: Previously spent fuel was not considered to be a waste and was reprocessed for recycle. However, direct disposal in a geologic repository is now being considered as an</td></tr>
</table>

COUNTRY [REFERENCE]	CLASSIFICATION SYSTEM
	option.
Brazil [A–5]	*Exempt waste*: Activity levels equal or below the exemption limits which are based on a maximum annual dose to members of the public of less than 0.01 mSv. Very short-lived waste (VSLW): Waste containing radionuclides with half-lives of the order of 100 days or less, with activity concentrations above the clearance levels *Low and Intermediate level waste*: Activity levels above exemption limits, with half-lives greater than 100 days and heat generation equal to or less than 2 kW/m^3. Subdivided into: - *Short lived*: waste containing radionuclides with half-life of less than about 30 years to beta/gamma emitters, with a limit of 370 Bq/g on average and up to 3700 Bq/g for individual packages for long lived alpha emitters - *Containing naturally occurring radionuclides from the extraction and processing oil operations:* waste containing radionuclides from the decay series of Uranium and Thorium with activity concentrations above the clearance levels - *Containing naturally occurring radionuclides from the mining or processing of ores and minerals:* waste containing radionuclides from the decay series of Uranium and Thorium with activity concentrations above the clearance levels - *Long lived*: long lived radionuclide concentrations exceeding limitations for short-lived waste. *High level waste*: Heat generation greater than 2kW/m^3 and long lived alpha emitting radionuclide concentrations exceeding limitations for short-lived waste. *Spent fuel* is not currently considered to be a waste, pending future decision on its disposition, which may include reprocessing or disposal.
Canada [A–6]	A definitive numerical boundary between the various categories of radioactive waste (primarily low and intermediate level) is not provided, since activity limitations differ between individual radionuclides or radionuclide groups and will be dependent on both short and long-term safety management considerations. A contact dose rate of 2 mSv/h has been used, in some cases, to distinguish between low and intermediate level radioactive waste. *Low level radioactive waste* (LLW) contains material with radionuclide content above established clearance levels and exemption quantities, and generally limited amounts of long lived activity. LLW requires isolation and containment for up to a few hundred years. LLW generally does not require significant shielding during handling and interim storage. LLW also includes: — *Very short-lived low level radioactive waste* (VSLLW) is waste that can be stored for decay for up to a few years and subsequently cleared for release. This classification includes radioactive waste containing only short half-life radionuclides, of the kind typically used for research and biomedical purposes; — *Very low level radioactive waste* (VLLW) has a low hazard potential, but is nevertheless above the criteria for exemption. Long-term waste management facilities for VLLW do not usually need a high degree of containment or isolation. A near surface repository with limited regulatory control is generally suitable. Typically, VLLW includes bulk material, such as low activity soil and rubble, decommissioning wastes and some uranium contaminated wastes. *Intermediate level radioactive waste* (ILW) is waste that typically exhibits sufficient levels of penetrating radiation to warrant shielding during handling and interim storage. This type of radioactive waste generally requires little or no provision for heat dissipation during its handling, transportation and long-term management. However, because of its total radioactivity level, some ILW may have heat generation implications in the short term. ILW generally contains long lived radionuclides in concentrations that require isolation and containment for periods beyond several hundred years (e.g., beyond 300 to 500 years). ILW would also include alpha bearing radioactive waste (wastes containing one or more alpha emitting radionuclides, usually actinides) in quantities above the levels acceptable for near surface repositories. ILW is sometimes subdivided into short-lived (ILW-SL) and

COUNTRY [REFERENCE]	CLASSIFICATION SYSTEM
	long lived (ILW-LL), depending on the quantity of long lived radionuclides present. *High level radioactive waste* (HLW) is used (irradiated) nuclear fuel that has been declared radioactive waste or waste that generates significant heat (typically more than 2 kW/m^3) via radioactive decay. In Canada, 'irradiated nuclear fuel' or 'used nuclear fuel' is a more accurate term than spent fuel, as discharged fuel is considered a waste material even when it is not fully spent. *Uranium mine waste rock and mill tailings* (UMM) are a specific type of radioactive waste generated during the mining and milling of uranium ore and the production of uranium concentrate. In addition to tailings, mining activities typically generate large quantities of mineralized and unmineralized waste rock excavated to access the ore body. The tailings and mineralized waste rock contain significant concentrations of long lived radioactive elements, namely thorium-230 and radium-226.
China [A–7]	Classification for solid wastes: *Low level waste* (LLW): Specific activity not exceeding 4×10^6 Bq/kg Intermediate level waste (ILW): • Half-life longer than 60 days but ≤ 5 years, specific activity not exceeding 4×10^6 Bq/kg; OR • Half-life longer than 5 years, but ≤ 30 years, with specific activity > 4×10^6 Bq/kg but not exceeding 4×10^{11} Bq/kg; OR • Half-life longer than 30 years, specific activity > 4×10^6 Bq/kg, and heat release rate not exceeding 2 kW/m^3 High level waste (HLW): 1) Half-life longer than 5 years, but ≤ 30 years, with heat release rate > 2 kW/m^3 or specific activity > 4×10^{11} Bq/kg; OR 2) Half-life longer than 30 years, specific activity > 4×10^{10} Bq/kg, or heat release rate > 2 kW/m^3 *Alpha radioactive waste*: Alpha emitting nuclides with half-life longer than 30 years, specific activity in a single package > 4×10^6 Bq/kg
Croatia [A–8]	*Exempt and cleared radioactive waste*: activity concentrations or total radioactive waste activity at or below prescribed exemption or clearance levels *Low level short-lived radioactive waste*: radioactive waste containing radionuclides with half-life less than 100 days which will decay below clearance levels within 3 years *Low and intermediate level radioactive waste*: radioactive waste containing radionuclides with half-life less than 30 years and activity concentration or total activity which will remain above prescribed exemption or clearance levels 3 years after their creation, and having a heat generation rate below 2 kW/m^3 *Short-lived waste*: low and intermediate level waste containing radionuclides with half-life less than 30 years (limitation of long lived alpha emitting radionuclides to 4 000 Bq/g in individual packages and to an overall average of 400 Bq/g in the total waste volume) *Long lived waste*: low and intermediate level radioactive waste activity concentrations exceeding the limits for short-lived waste *High level radioactive waste*: radioactive waste thermal power above 2 kW/m^3 and activity concentrations exceeding limits for short-lived waste
Czech Republic [A–9]	*Temporary Radioactive Waste* is waste in which radioactivity after long-term storage (up to 5 years) is lower than release levels. *Low and intermediate level waste* (LILW) is divided into two sub-groups: 1) *Short-term waste* with the radionuclide half-life (including ^{137}Cs) less than 30 years and with limited mass activity of long-term alpha sources (per cask up to 4000 kBq/kg and the mean value 400 kBq/kg for the total volume of waste

COUNTRY [REFERENCE]	CLASSIFICATION SYSTEM
	generated in one calendar year), and 2) *Long-term waste* which includes all those not classified in the 'short-term' radioactive waste sub-group, *High level waste* (HLW) requires storage and disposal considering the heat released from decay of radionuclides contained therein. *Spent fuel* (SF) is not considered to be radioactive waste under the Atomic Act unless it has been declared as radioactive waste by its owner, or by SÚJB (the nuclear regulator). SF storage shall be subject to the requirements equal to radioactive waste before disposal and SF shall be stored so that its further treatment is not impeded. Repositories containing solely natural radionuclides (NORM waste) are not considered nuclear installations under the Atomic Act.
Cyprus [A–10]	Uses the IAEA classification system (see below).
Finland [A–11]	*Low level waste* contains so little radioactivity that it can be treated at the NPP without any special radiation protection arrangements. The activity concentration in waste is less than 1 MBq/kg, as a rule. *Intermediate level waste* contains radioactivity to the extent that effective radiation protection arrangements are needed when they are processed. The activity concentration in the waste is in the range of 1 MBq/kg to 10 GB q/kg, as a rule. For disposal purposes, L&ILW is further subdivided into: • *Short-lived waste* refers to nuclear waste the activity concentration of which after 500 years is below the level of 100 MBq/kg in each disposed waste package, and below an average value of 10 MBq/kg of waste in one emplacement room. • *Long lived waste* refers to nuclear waste, the activity concentration of which after 500 years is above the level of 100 MBq/kg in a disposed waste package, or above an average value of 10 MBq/kg of waste in one emplacement room. *Spent fuel* is defined under The Nuclear Energy Act as nuclear waste, destined for disposal in a permanent manner. Due to its high activity and heat generation, spent fuel is regarded as high level waste.
France [A–12]	*Very low level waste* (TFA) has activity level generally lower than 100 Bq/g. It is mostly due to the operation, maintenance and dismantling of NPPs, fuel cycle facilities and research establishments. *Low level and intermediate level short-lived* (FMA-VC) waste results mainly from the operation and dismantling of nuclear power plants, fuel cycle facilities and research establishments. It has activity levels between TFA and FA-VLL/MA-VLL. *Low level long lived* (FA-VL) waste consists mainly of graphite and radium bearing waste. The activity of graphite waste ranges between 10,000 Bq/g and a few hundreds of thousands of Becquerels per gram. Its long-term activity lies essentially with long lived beta emitting radionuclides. Radium bearing waste contains long lived alpha emitting radionuclides and their activity lies between a few tens to a few thousands of Becquerels per gram. *Intermediate level long lived* (MA-VL) waste has activity ranging between 1 million and 1 billion Becquerels per gram. There is either no or negligible heat generation. It originates mostly from the reprocessing of spent fuel. *High level* (HA) waste consists mainly of vitrified waste packages in the form of stainless steel containers, which contain the vast majority of radionuclides from reprocessing of spent fuel, whether in the form of fission products or minor actinides. The activity level of vitrified waste lies in the order of several billions of Becquerels per gram and it generates significant heat. *Spent fuel* is not generally considered to be a waste and is normally reprocessed and recycled. However, some limited amounts of spent fuel that are not compatible with the

COUNTRY [REFERENCE]	CLASSIFICATION SYSTEM
	reprocessing facilities may be directly disposed as a waste.
Germany [A–13]	The German waste classification system is based on heat generating capacity of the waste: • *Negligible heat generating radioactive wastes* are radioactive waste with an average heat output of less than about 200 W/m^3 of waste (corresponding to a 3 degree K increase in temperature at the wall of the disposal chamber of the Konrad repository caused by decay heat from the radionuclides contained in the waste packages) • *Heat generating radioactive wastes* are characterized by high activity concentrations and therefore by high decay heat output. This category includes reprocessing residues and spent fuel.
Greece [A–14]	Uses the IAEA classification system (see below).
Hungary [A–15]	*Low and intermediate level wastes* are defined in terms of multiples of the exemption quantity for radionuclides (as defined in national regulations, which are consistent with European Union directives). If the sum of the ratio of the concentration of each radionuclide to its exemption concentration is less than 1000, it is LLW. If it is greater than 1000, it is ILW. For disposal purposes, L&ILW is further subdivided into: • *Short-lived low and intermediate level waste* is when the half-life of the radionuclides is 30 years or less, and it contains long lived alpha emitting radionuclides only in limited concentration; • *Long lived low and intermediate level waste* is when the half-life of the radionuclides and/or the concentration of the alpha emitting radionuclides exceed the limits concerning short-lived waste. *High level waste* is defined as waste whose heat production needs to be considered during the design and operation of storage and disposal. *Spent fuel* was not originally considered to be a waste and was returned to the former Soviet Union for reprocessing. However, since the collapse of the Soviet Union, it has been in interim storage at the nuclear power plant site pending a decision on its future management, which may include direct disposal along with the HLW.
International Waste Classification System [A–16]	*Exempt Waste* (EW): Activity levels at or below clearance levels, which are based on an annual dose to members of the public of less than 0.01 mSv. *Very Short-lived Waste* (VSLW): Waste that can be stored for decay over a limited period of up to a few years and subsequently cleared from regulatory control according to arrangements approved by the regulatory body, for uncontrolled disposal, use or discharge. This class includes waste containing primarily radionuclides with very short half lives often used for research and medical purposes. *Very Low Level Waste* (VLLW): Radioactive waste considered suitable by the regulatory body for authorized disposal, subject to specified conditions, with ordinary waste in facilities not specifically designed for radioactive waste disposal. *Low and Intermediate Level Waste* (LILW): activity levels above EW and thermal power ~< $2kW/m^3$ LILW is subdivided into: • *Short lived Low and Intermediate Level Waste* (LILW-SL), short-lived waste with long lived alpha nuclides of less than 400 Bq/g average or 4000 Bq/g for individual packages • *Long lived Low and Intermediate Level Waste* (LILW-LL), long lived concentrations above LILW-SL *High Level Waste* (HLW): thermal power > 2 kW/m^3 and long lived radionuclide concentrations above LILW-SL. This category includes spent fuel where it has been declared a waste.

COUNTRY [REFERENCE]	**CLASSIFICATION SYSTEM**
India [A–17]	Classification system for solid waste based on surface dose rates and nuclide type. *Category I*: ≤ 2 mGy/h Beta, Gamma emitters. *Category II*: between 2 and 20 mGy/h Beta, Gamma emitters. Category III: ≥ 20 mGy/h Beta, Gamma emitters. *Category IV*: Alpha bearing waste, Alpha emitters dominant. (not normally encountered in NPPs). *Spent fuel* is not considered to be a waste in India.
Iran, Islamic Republic of [A–18]	*Exempt waste (EW)* – activity levels at or below clearance *Low and Intermediate Level Waste (LILW)* – activity levels above clearance levels and residual heat generation below 2 kW/m^3 • *Short-lived Waste (LILW-SL)*, restricted long lived radionuclide • *Long Lived Waste (LILW-LL)*, long lived radionuclide concentrations above limitations for short-lived waste *High Level Waste (HLW)* – residual heat generation above 2 kW/m^3 and long lived radionuclide concentrations above limitations for short-lived waste
Italy [A–19]	The new classification system, established by a the Decree from Ministries of Economic Development and of the Environment of August 7th, 2015 provides for five different categories: *Very Short Lived Waste* Radioactive waste containing radionuclides with very short half-life, of less than 100 days, requiring up to 5 years to reach activity concentrations lower than values specified in art. 1, paragraph 2 of Legislative Decree n. 230 of 17 March 1995. This type of waste mainly arises from medical uses and research activities. *Very Low Level Waste* Radioactive waste with activity concentration that does not meet the criteria set out for exempt waste, but though lower than 100 Bq/g with a maximum alpha contribute of 10 Bq/g for alpha-emitting long-lived radionuclides. This waste will be disposed of in the near surface disposal facilities at the National Repository envisaged by the Legislative Decree n. 31 of 15 February 2010. This category includes also radioactive waste containing mainly short lived radionuclides, which over a period of up to 10 years reach an activity concentration beneath the clearance levels set out in Article. 30 and Art. 154, paragraph 3-bis of the Legislative Decree n. 230 of 17 March 1995. This waste shall be stored in facilities suitable for temporary storage or management of wastes for disposal, such as those authorized by the art. 33 of Legislative Decree n. 230 of 17 March 1995. *Low Level Waste* Radioactive waste that does not meet the criteria established for exempt waste and that requires containment and isolation periods of up to a few hundred years in order to be disposed of. This category includes radioactive waste characterized by levels of activity concentration of up to 5 MBq/g for short-lived radionuclides, of up to 40 kBq/g for the long lived isotopes of Nickel and of up to 400 Bq/g for long lived radionuclides. This category includes much of the waste from nuclear installations, such as parts and components of the plant arising from the dismantling operations and from some medical, industrial and scientific research uses. This category of waste will be disposed of in near surface disposal facility at the National Repository envisaged by Legislative Decree n.31 of 15 February 2010. *Intermediate Level Waste* Radioactive waste with activity concentrations exceeding the values set out for low level

COUNTRY [REFERENCE]	CLASSIFICATION SYSTEM
	waste, though not requiring provisions for heat dissipation during its storage and disposal. This category includes waste containing long lived radionuclides that mostly requires a degree of isolation higher than that provided by near surface disposal facilities with engineered barriers, therefore requiring disposal in geological formations. Pending the availability of a disposal facility in geological formation, such waste shall be stored in suitable storage facilities, such as the long term storage facility in the National Repository envisaged by art. 2, paragraph 1, letter e) of Legislative Decree n. 31 of 15 February 2010. This category includes also waste characterized by levels of activity concentrations of up to 400 Bq/g for alpha-emitting radionuclides and mainly containing radionuclides beta/gamma emitters even long lived, with such an activity concentrations that they can be disposed of in near surface facilities with engineered barriers, provided that the level of activity concentration complies with the objectives of radiation protection established for the above-mentioned surface disposal facility, such as, for instance, the waste containing activation products arising from the decommissioning of some parts of the nuclear facilities. *High Level Waste* Radioactive waste with high activity concentrations, such as to generate a significant amount of heat or with high concentrations of long-lived radionuclides, or both of these characteristics, which require a degree of isolation and containment for a time period of thousands of years and over. This waste requires disposal in geological formations. This category includes, in particular, liquid waste with high activity concentration arising from the first extraction cycle (or equivalent liquid) of nuclear fuel reprocessing facilities, or the spent fuel itself in case of direct disposal without reprocessing. In the pre-disposal period, this waste shall be stored in suitable storage facilities, such as the long term storage facility in the National Repository envisaged by Art. 2, Para. 1(e) of Legislative Decree no. 31 of 15 February 2010.
Japan [A–20]	Two basic solid waste categories: *Category 1, High level waste* (HLW): Wastes requiring geologic disposal, e.g. vitrified waste that contains fission product separated from spent fuel during reprocessing. *Category 2, Low level Waste* (LLW): all other radioactive waste, subdivided into several categories based on origin and type: *Long lived low heat radioactive waste* from reprocessing and MOX fabrication (TRU waste) *Waste from power reactors*, further subdivided as: • *Relatively higher activity waste*, e.g. irradiated core components • *Relatively lower activity waste*, e.g. routine solid wastes generated at NPPs • *Very low level radioactive waste* (VLLW), e.g. bulk concrete & other low activity materials *Uranium waste*, waste generated from uranium enrichment and uranium fuel fabrication facilities *Waste from research facilities*, waste generated from research, medical and industrial facilities using or producing radioisotopes *Spent fuel* is not considered to be a waste in Japan. However, the policy of reprocessing and recycling of fuel is currently under review.
Korea, Republic of [A–21]	*Exempt waste:* the clearance levels in the Republic of Korea are such that the annual individual dose shall be below 0,01 mSv/y and the total collective dose shall be below 1 person-Sv/y concurrently. *Low and Intermediate Level Waste* (LILW): waste with characteristics above exempt waste, but below HLW. *High level waste* (HLW): waste with radioactivity: ≥ 4 000 Bq/g for α-emitting

COUNTRY [REFERENCE]	**CLASSIFICATION SYSTEM**
	radionuclide having a half-life longer than 20 years or heat generation rate of ≥ 2 kW/m^3 *Used nuclear fuel* is not currently considered to be a waste and is in storage at reactor sites pending a future decision on its disposition.
Lithuania [A–22]	*Class 0 (Exempt waste)* – Surface dose rate less than $0.2*10^{-3}$ mSv/h, *Class A (VLLW*) – surface dose rate between $0.2*10^{-3}$ and 0.5 mSv/h, there is no need for final treatment and it will be disposed in landfill repository *Class B (LLW-SL)* – surface dose rate between 0.5 and 2 mSv/h, waste needs final treatment and disposal in near surface repository *Class C (ILW-SL)* – surface dose rate over 2 mSv/h, waste needs final treatment and disposal in near surface repository *Class D (LLW-LL)* – surface dose rate less than 10 mSv/h, waste needs final treatment and disposal in near surface repository. *Class E (ILW-LL)* – surface dose rate over 10 mSv/h, waste needs final treatment and disposal in deep geological repository *Class F (DSRS)* – waste needs final treatment and disposal in near surface or deep geological repository
Malaysia [A–23]	*Naturally Occurring Radioactive Materials (NORM) residue is considered as radioactive waste if the exposure to the general public would exceed 1 mSv/a.* *Cleared Waste* – Cleared waste is materials containing level of radionuclides at activity concentrations less than those specified in the Second Schedule of the Atomic Energy Licensing (Radioactive Waste Management) Regulations 2011. All wastes fall under this category can be disposed of at sanitary landfill without any further action. *Low Level (Short lived)/Decay Waste* – Low Level (Short lived)/Decay Waste is a low level waste containing short-lived radionuclides only (half-lives less than 100 days) that will decay to clearance levels within three years after the times of its generation. Most of the radioactive waste comes from nuclear medicine activities fall under this category. *Low and Intermediate Level Short-lived Waste (LILW-SL)* – Low and Intermediate Level Short-lived Waste (LILW-SL) is radioactive waste which will not decay to clearance levels within three years containing beta/gamma emitting radionuclides with half-lives less than thirty years or alpha emitting radionuclides with an activity concentration less than 400 Bq/g and a total activity less than 4 000Bq in each radioactive waste package. *Low and Intermediate Level Long Lived Waste (LILW-LL)* – Low and Intermediate Level Long Lived Waste (LILW-LL) is a radioactive waste containing radionuclides with activity concentrations more than LILW-SL but which does not generate heat above 2 kW/m^3. *High Level Waste (HLW)* – High Level Waste (HLW) is a radioactive waste containing radionuclides with activity concentrations more than LILW-SL but which generates heat above 2 kW/m^3.
Morocco [A–24]	*Level I* – low level waste (<10MBq) contained by short-lived (half-life <61 days) are managed by decay at the place of production and discharge after 10 times of half-life with authorization from regulatory body *Level II* – low level waste contaminated by radio-isotopes which have half-life below or equal to 30 years and long lived radionuclides in restricted quantity with the condition that their decay don't let them reach the discharge level in 12 months following their production with the alpha emitters are limited to 4000 Bq/g for each package *Level III* – low and intermediate level waste containing radionuclides having a half-life above 30 years and alpha emitters in quantity exceeding the limits fixed for level II. This waste can be evacuated only in geological disposal *Level IV* – high level waste having a thermal flux superior to 2 kW/m^3 and containing alpha emitters in quantity exceeding the limits fixed for the level II. This waste can be evacuated only in geological disposal

COUNTRY [REFERENCE]	CLASSIFICATION SYSTEM
Netherlands [A–25]	*Naturally Occurring Radioactive Materials* (NORM): This is considered to be radioactive waste in the Netherlands and is managed in a central facility with other radioactive wastes, generally as very low-level waste. *Depleted Uranium* (DepU): This is considered to be radioactive waste in the Netherlands and is managed in a central facility with other radioactive wastes, generally as very low-level waste. *Low and Intermediate Level Waste* (LILW) is divided into 4 categories: • *Category A:* alpha bearing waste • *Category B:* Beta/gamma contaminated waste from nuclear power plants • *Category C:* Beta/gamma contaminated waste from generators other than nuclear power plants with a half-life longer than 15 years • *Category D:* Beta/gamma contaminated waste from generators other than nuclear power plants with a half-life shorter than 15 years No distinction is made between short-lived and long lived LILW as defined by the IAEA Safety Guide on Classification. The reason is that shallow land burial is not applicable for the Netherlands. All categories of waste will be disposed of in a deep geologic repository in the future (due to the small amounts of radioactive waste, no separate disposal facilities for LILW and HLW are envisaged). *High Level Waste* (HLW) is divided into 2 categories: • *Heat generating*, consists of the vitrified waste from reprocessing of spent fuel from the two nuclear power reactors in the Netherlands (Borssele and Dodewaard), the spent fuel of the two research reactors (Petten and Delft) and the spent uranium targets of the molybdenum production. • *Non heat generating*, is mainly formed by the reprocessing waste other than the vitrified residues. It also includes waste from research on reactor fuel and some decommissioning waste. *Spent fuel* from power reactors is not considered to be a waste and is reprocessed for recycle.
Norway [A–26]	Norwegian legislation does not specify any criteria for the classification of radioactive waste above exemption limits. Historically the following categories were used: spent fuel, ion exchange resins, 'Some sources' and the other wastes. The waste was segregated according to half-life: *Category I*: ≤ 1 year *Category II*: > 1 ≤ 30 years *Category III*: > 30 years Waste packages were sorted according to dose rate levels on the waste drum. For a contact dose rate of >10 mSv/hour, lead shielding is used inside the drums.
Poland [A–27]	Radioactive waste is classified into three categories with respect to the concentration of radioactive isotopes contained in the waste: low, medium and high level radioactive waste. These categories are further subdivided into subcategories according to the half live of radioactive isotopes and the concentration of radioactive isotopes contained in the waste. Liquid waste is additionally classified according to its activity concentration. Spent nuclear fuel intended for disposal is classified as a high level radioactive waste. The low, intermediate and high level waste is subsequently classified into subcategories: - Transitional waste which will decay within the period of three years below the value defined in the legislation, - Short-lived waste – waste containing radionuclides of half-life < 30 years with the restricted long lived radionuclides concentration to 4 000 kBq/kg in individual waste packages and to an overall average of 400 kBq/kg in the total waste volume,

COUNTRY [REFERENCE]	CLASSIFICATION SYSTEM
	- Long lived waste: waste whose long lived radionuclides activity exceeds 400 kBq/kg.
Romania [A–28]	*Excluded radioactive waste* (EW) is waste containing radionuclides with an activity concentration so small that the waste can be released from regulatory control (conditionally or unconditionally). *Transitional radioactive waste* (TW) is waste having activity concentration above clearance levels, but which decays below clearance levels within a reasonable storage period (not more than 5 years). *Very low level radioactive waste* (VLLW) is short-lived waste in which the activity concentration is above the clearance levels, but with a radioactive content below levels established by Regulator for defining the low level waste. The disposal of very low level waste requires less complex arrangements than the disposal of short-lived low level waste. *Low and intermediate level radioactive waste* (LILW) is radioactive waste in which the activity concentration is above the levels established by Regulator for the definition of very low level waste, but with a radioactive content and thermal power below those of high level waste. Low level waste does not require shielding during handling or transportation. Intermediate level waste generally requires shielding during handling, but needs little or no provision for heat dissipation during handling or transportation. - *Long lived radioactive waste* is a waste containing radionuclides with half-life above 30 years in quantities and/or concentrations of activity above the values established by Regulator, for which isolation from biosphere is necessary for more time than the institutional control duration. - *Short-lived radioactive waste* is a radioactive waste that is not long lived. *High level radioactive waste* (HLW) is: - liquid radioactive waste containing the most part of fission products and actinides existing initially in the spent fuel and forming the residues of the first extraction cycle of reprocessing; - the solidified radioactive waste of (a) - spent fuel; and - any other radioactive waste with activity concentration range similar to the waste mentioned above.
Russian Federation [A–29]	Resolution of the Government of the Russian Federation №1069 established classification criteria for removable RW based on appropriate disposal concepts. All radioactive waste defined as removable RW are divided into 6 classes: • Class 1 covers solid high-level RW requiring final disposal in deep disposal facilities after prior storage to reduce heat generation. • Class 2 covers solid high-level RW and intermediate-level long-lived RW containing radionuclides with half-lives greater than 30 years that require final disposal in deep disposal facilities and not subjected to prior storage to reduce heat generation. • Class 3 covers solid intermediate-level RW and low-level long-lived RW containing radionuclides with half-lives greater than 30 years that require final disposal in near-surface disposal facilities at a depth of up to 100 m. • Class 4 covers solid low-level RW and very low-level RW requiring final disposal in near surface disposal facilities located at the ground level. • Class 5 covers liquid intermediate-level and low-level RW requiring final disposal in deep well injection facilities constructed and operated at the time the Federal Law «On the Management of Radioactive Waste and Amendments to Certain Legislative Acts of the Russian Federation» came into force. • Class 6 covers RW generated in mining and processing of uranium ores or during operations that are not associated with atomic energy use, namely, mining and reprocessing of mineral and organic raw materials with high concentrations of naturally occurring radionuclides that require final disposal in near-surface disposal facilities.

COUNTRY [REFERENCE]	CLASSIFICATION SYSTEM

Numerical thresholds for the specific activity levels of radionuclides contained in RW provide distinction between classes 1-5 based on the period of RW potential hazard.

OSPORB-99/2010 establishes RW classification based on RW specific activity (with account of Amendment №1 to OSPROB-99/2010 introduced by the resolution of the Chief Public Health Official of the Russian Federation № 43 of September 16, 2013). Numerical values for these criteria are presented in the Table below.

Based on specific activity levels, solid radioactive waste containing man-made radionuclides, except for spent sealed radionuclide sources are divided into 4 categories: very low-level, low-level, intermediate-level and high-level waste, whereas liquid waste are divided into 3 categories: low-level, intermediate-level and high-level waste. If, according to the radionuclide characteristics, radioactive waste can be attributed to different categories, such waste shall be attributed to the highest possible category.

Table. Classification of Solid and Liquid Radioactive Waste (Russian Federation)

Wastes category	**Specific activity, Bq/kg (Bq/l)**			
	tritium	**β-and γ-emitters (excluding tritium)**	**α-emitters (excluding transuranic)**	**transuranic elements**
Solid Waste				
Very low-level	less than 10^7	less than 10^3	less than 10^2	less than 10^1
Low-level	from 10^7 to 10^8	from 10^3 to 10^4	from 10^2 to 10^3	from 10^1 to 10^2
Intermediate-level	from 10^8 to 10^{11}	from 10^4 to 10^7	from 10^3 to 10^6	from 10^2 to 10^5
High-level	more than 10^{11}	more than 10^7	more than 10^6	more than 10^5
Liquid Waste				
Low-level	less than 10^4	less than 10^3	less than 10^2	less than 10^1
Intermediate-level	from 10^4 to 10^8	from 10^3 to 10^7	from 10^2 to 10^6	from 10^1 to 10^5
High-level	more than 10^8	more than 10^7	more than 10^6	more than 10^5

Slovakia

[A–30]

Transitional radioactive waste, the activity of which decreases during storage below the limit value enabling their release into environment;

Very low activity radioactive waste, whose activity is slightly higher than the limit value for their introduction to the environment, contain mainly radionuclides with a short half-life, or also a low concentration of radionuclides with a long half-life, and which during storage require a lower degree of isolation from the environment through a system of engineered barriers, as in the case of surface type radioactive waste repositories;

Low level radioactive waste, whose average specific activity of radionuclides with a long half-life, especially radionuclides emitting alpha radiation, is equal to or over 400 Bq/g, maximum specific activity of radionuclides with a long half-life, especially emitting alpha radiation, is locally less than 4 000 Bq/g, does not produce residue heat, and following treatment meet safe operating limits and conditions for surface type radioactive waste repositories

Medium activity radioactive waste, whose average specific activity of radionuclides with a

COUNTRY [REFERENCE]	CLASSIFICATION SYSTEM
	long half-life, especially radionuclides emitting alpha radiation, is equal to or over 400 Bq/g, may produce residual heat and measures for its removal are less than in the case of highly active radioactive waste, and which following treatment do not meet safe operating limits and conditions for surface/type radioactive waste repositories *High level radioactive waste*, whose average specific activity of radionuclides with a long half-life, especially radionuclides emitting alpha radiation, exceeds values specified for low activity radioactive waste requiring measures for the removal of residual heat and can be deposited only in an underground-type radioactive waste repository. It has not been defined yet when the *spent fuel* becomes high level radioactive waste.
Slovenia [A–31]	*Transitional radioactive waste* - the activity of which decreases during storage below the limit value enabling their release into environment; *Very low level radioactive waste*, for which the competent regulatory body for nuclear and radiation safety may approve conditional clearance; *Low and intermediate level radioactive waste* (LILW), with insignificant heat generation, which is classified into two groups: a) *Short-lived LILW*, containing radionuclides with a half-life shorter than 30 years and specific activity of alpha emitters equal to or lower than 4,000 Bq/g for an individual package, but on average not higher than 400 Bq/g in the overall amount of LILW; b) *Long lived LILW*, where specific activity of alpha emitters exceeds the limitations for short-lived LILW; *High level radioactive waste* (HLW), which contains radionuclides whose decay generates such an amount of heat that it has to be considered in its management; *NORM* - Radioactive waste containing naturally occurring radionuclides that are generated in processing of nuclear mineral materials or other industrial processes and are not sealed sources of radiation in accordance with the regulations on the use of radioactive sources and radiation practices.
South Africa [A–32]	*Naturally Occurring Radioactive Materials - low activity* (NORM-L): Potential Radioactive waste containing low concentrations of NORM. Long lived radionuclide concentration < 100 Bq/g. *Naturally Occurring Radioactive Materials - enhanced activity* (NORM-E): Radioactive waste containing enhanced concentrations of NORM. Long lived radionuclide concentration > 100 Bq/g. *Very Low Level Waste* (VLLW): Radioactive waste containing very low concentration of radioactivity. *Low and Intermediate Level Wastes- Short-lived* (LILW-SL): Radioactive waste with low or intermediate short/lived radionuclide and/or low long lived radionuclide concentrations - Thermal power (mainly due to short-lived radio nuclides (T ½ < 31 y) <2 kW/m^3) AND - Long lived alpha radio nuclides (T ½ > 31 y) concentrations: o Alpha: < 400 Bq/g o Beta and gamma: <4 000 Bq/g - OR Long lived alpha, beta and gamma emitting radionuclides at activity concentration levels that could result in inherent intrusion dose (the intrusion dose assuming the radioactive waste is spread on the surface) below 10 mSv per annum. *Low and Intermediate Level Wastes- Long Lived* LILW-LL: Radioactive waste with low or intermediate short-lived radionuclide and intermediate long lived radionuclide concentrations. - Thermal power (mainly due to short-lived radio nuclides (T ½ < 31 y) <2 kW/m^3) AND - Long lived alpha radio nuclides (T ½ > 31 y) concentrations: o Alpha: < 4 000 Bq/g o Beta and gamma: <40 000 Bq/g - OR Long lived alpha, beta and gamma emitting radionuclides at activity concentration

COUNTRY [REFERENCE]	CLASSIFICATION SYSTEM
	levels that could result in inherent intrusion dose (the intrusion dose assuming the radioactive waste is spread on the surface) between 10 and 100 mSv per annum. *High Level Wastes* (HLW): Heat generating radioactive waste with high, long and short-lived radionuclide concentrations • with thermal power > 2 kW/m^3 or • Long lived alpha, beta and gamma emitting radionuclides at activity concentration levels > levels specified for LILW-LL or • Long lived alpha, beta and gamma emitting radionuclides at activity concentration levels that could result in inherent intrusion dose (the intrusion dose assuming the radioactive waste is spread on the surface) above 100 mSv per annum
Spain [A–33]	*Low and Intermediate Level Wastes* (LILW), which include those whose activity is due mainly to the presence of beta or gamma-emit ting radionuclides with short or intermediate half-lives (less than 30 years), and whose content of long lived radionuclides is very low and limited. This group includes the sub-category of *Very Low Level Wastes* (VLLW). *Special Waste* (SW), in accordance with Nuclear Safety Council Instruction IS-29 on safety criteria in temporary storage facilities for spent fuel and high level radioactive waste, includes the following: nuclear fuel attachments; neutron sources; used in-core instrumentation or substituted components deriving from the reactor vessel system and reactor internals, generally metallic and presenting a high level of radiation through neutron activation; and other waste which, because of its radiological characteristics, is not eligible for management in the existing near surface level definitive disposal facility for LILW in Spain. Its management is connected to that of High Level Waste. *High Level Wastes* (HLW) are those that contain long lived alpha emitters with half lives of more than 30 years in appreciable concentrations and that may generate heat as a result of radioactive decay, due to their high specific activity. This category includes spent fuel. Also included, for the purposes of integral management, are those other Intermediate Level wastes (ILW) that in view of their characteristics are not eligible for definitive management under the conditions established for 'El Cabril' and that require specific installations for this purpose.
Sweden [A–34]	There is no legally defined waste classification system in Sweden for nuclear or radioactive waste. There are, however, established waste acceptance criteria for different disposal routes of nuclear and radioactive waste. Current disposal routes are: *Shallow land burial* (equivalent to Very Low Level Waste): the main criterion is that the releases of radionuclides from the facilities shall not contribute significantly to the releases from the already existing nuclear facilities at the site. Therefore, the total activity content is limited to 100–1100 GBq per facility, of which a maximum of 10 GBq may consist of alpha-active substances. *SFR* (for short-lived L&ILW): • Silo: Short-lived L&ILW, max dose rate 500 mSv/h • BMA vault: Short-lived L&ILW, max dose rate 100 mSv/h • BTF vaults: Short-lived L&ILW, max dose rate 10 mSv/h • BLA vault: Short-lived L&ILW, max dose rate 2 mSv/h *Spent fuel* is considered to be a waste in Sweden.
Switzerland [A–35]	*High level waste* (HAA): Vitrified fission product waste from the reprocessing of spent fuel, or spent fuel if declared as waste. *Alpha-toxic waste* (ATA): Waste with a concentration of alpha-emitters exceeding 20 000 Bq/g of conditioned waste. *Low and intermediate level waste* (SMA): All other radioactive waste.
United Arab Emirates [A–36]	Uses the IAEA classification system (see above).

COUNTRY [REFERENCE]	**CLASSIFICATION SYSTEM**
United Kingdom [A–37]	In the UK, historically, radioactive waste has been classified under the following broad categories, according to its heat-generating capacity and activity content: *High-level waste* High-level waste (HLW) is waste in which temperature may rise significantly as a result of its radioactivity, so that this factor has to be taken into account in designing storage or disposal facilities. *Intermediate-level waste* Intermediate-level waste (ILW) is waste with radioactivity levels exceeding the upper boundaries for low-level waste (LLW), but which does not require heating to be taken into account in the design of storage or disposal facilities. *Low-level waste* Within the UK, LLW is now defined as radioactive waste having a radioactive content not exceeding 4gigabecquerels per tonne (GBq/te) of alpha and/or 12GBq/te of beta/gamma activity. This general definition does not directly equate to the waste acceptance criteria in place at specific disposal sites for LLW. *Very-low-level waste* *Very Low Level Waste (VLLW),* a sub-category of LLW is defined as: <u>in the case of low volumes (‘dustbin loads’) – low-volume VLLW:</u> *“Radioactive waste which can be safely disposed of to an unspecified destination with municipal, commercial or industrial waste (‘dustbin’ disposal), each 0.1m3 of waste containing less than 400kilobecquerels (kBq) of total activity or single items containing less than 40kBq of total activity.”* for wastes containing carbon-14 or hydrogen-3 (tritium): • in each $0.1m^3$, the activity limit is 4,000kBq for carbon-14 and hydrogen-3 (tritium) taken together; and • for any single item, the activity limit is 400kBq for carbon-14 and hydrogen-3 (tritium) taken together. Controls on disposal of this material, after removal from the premises where the wastes arose, are not necessary. <u>or, in the case of bulk disposals – high-volume VLLW:</u> *“Radioactive waste with maximum concentrations of 4megabecquerels per tonne (MBq/te) of total activity which can be disposed of to specified landfill sites. For waste containing hydrogen-3 (tritium), the concentration limit for tritium is 40MBq/te. Controls on disposal of this material, after removal from the premises where the wastes arose, will be necessary in a manner specified by the environmental regulators.”* The principal difference between the two definitions of VLLW is the need for controls on the total volumes of VLLW in the second (high-volume) category being deposited at any one particular landfill site. Higher-activity waste In the UK, HAW is defined by UK Government as the collection of: HLW, ILW, and the relatively small proportion of LLW that is not currently suitable for disposal in existing LLW disposal facilities (due to some chemical, physical or radiological property that is incompatible with the extant waste acceptance criteria).
United States of America [A–38]	The United States of America has two waste classification systems: one for ‘civilian’ wastes and the other for DOE (defense related) wastes. For civilian wastes, the categories are based on suitability for near surface disposal: *Low Level Waste* (LLW) is defined in regulation based on suitability for near surface disposal through consideration of concentrations of long and short-lived radionuclides. See 10 CFR 61 [USNRC 1982] for full definitions. It is subdivided into: *Class A low level waste* is determined by characteristics listed in 10 CFR 61.55 and physical form requirements in 10 CFR 61.56. (The US does not have a minimum threshold for Class A waste).

COUNTRY [REFERENCE]	CLASSIFICATION SYSTEM
	Class B low level waste is waste that must meet more rigorous requirements on waste form than Class A waste to ensure stability. *Class C low level waste* is waste that not only must meet more rigorous requirements on waste form than Class B waste to ensure stability but also requires additional measures at the disposal facility to protect against inadvertent intrusion. *Greater than Class C waste* (GTCC) is waste that exceeds the limits for Class C waste and is not generally acceptable for near surface disposal. *High level waste* (HLW): The highly radioactive material resulting from reprocessing of spent fuel, including liquid waste generated directly in reprocessing and any solid material derived from such liquid waste containing fission products in sufficient concentrations and other highly radioactive material that the NRC, consistent with existing law, determines by rule requires permanent isolation. *Spent fuel* (SF) is fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing. For civilian applications, this is considered to be a waste. *Byproduct material* (uranium mill tailings), tailings or wastes generated by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content. (Also referred to as AEA 11(e)2 waste.) The DOE classifies wastes as: *Low level waste (LLW)*:radioactive waste other than HLW, TRU and byproduct material. *High level waste* (HLW): (similar to civilian definition). *Transuranic waste* (TRU): US DOE owned waste (mostly defense related) contaminated with man made radioisotopes beyond or 'heavier' than uranium on the periodic table of the elements (long lived alpha emitting waste with concentrations greater than 3700 Bq/g [100 nCi/g]). Subdivided into: a) *Contact handled* TRU (CH): TRU waste with a surface dose rate of less than 200 millirem per hour b) *Remote handled* TRU (RH): TRU waste with a surface dose rate of 200 millirem per hour or greater *Byproduct material:* (similar to civilian definition). *Spent fuel*: The DOE does not consider spent fuel to be a waste.
Viet Nam [A–39]	*Low level waste, very short-lived (LLW-VSL)* – waste contains only very short-lived radionuclides (their half-life is shorter than 100 days) and can decay to the level lower than clearance levels within 5 years from generation *Low and intermediate level waste, short-lived (LILW-SL)* – radioactive waste can not decay to the level lower than clearance levels within 5 years from generation and contains radionuclides emitting beta/gamma with half-life from 100 days to 30 years or contains radionuclides emitting alpha with average activity concentration equal to or lower than 400 Bq/g *Low and intermediate level waste, long lived (LILW-LL)* – radioactive waste contains radionuclides having half-life longer than 30 years or contains radionuclides emitting alpha with average activity concentration higher that 400 Bq/g but activity concentration equal to or lower than 10^4 TBq/m^3 *High level waste (HLW)* – radioactive waste contains radionuclides with activity concentration higher than 10^4 TBq/m^3

TABLE A–5. NUCLEAR POWER FUEL CYCLE STRATEGIES

Country	Commercial scale reprocessing facility		Spent fuel currently in another country for reprocessing	Earlier reprocessing, but practice currently ceased	Planning direct placement of spent fuel in a repository	Undecided
	Existing	Planned				
Argentina						✓
Belgium				✓	✓	
Brazil						✓
Bulgaria			✓			
Canada					✓	
China[1]		✓			✓	
Czech Republic				✓	✓	
Finland				✓	✓	
France	✓					
Germany				✓	✓	
Hungary[2]				✓	✓	
India	✓					
Italy			✓			
Japan[3]		✓	✓			
Korea, Republic of					✓	
Lithuania					✓	
Mexico						✓
Netherlands			✓			
Pakistan						
Romania					✓	
Russian Federation	✓					
Slovakia				✓	✓	
Slovenia					✓	
Spain				✓	✓	
Sweden				✓	✓	

Country	Commercial scale reprocessing facility		Spent fuel currently in another country for reprocessing	Earlier reprocessing, but practice currently ceased	Planning direct placement of spent fuel in a repository	Undecided
	Existing	Planned				
Switzerland				✓	✓	
United Kingdom(4)	✓			✓	✓	
Ukraine(5)			✓	✓		✓
United States of America				✓	✓	

Notes:

1. The main policy in China is domestic reprocessing. However, some fuel, mainly from CANDU, reactors is planned for direct disposal;
2. Earlier fuel returns to Russian Federation, but no requirement to return residue from reprocessing to Hungary;
3. Commercial scale facility at Rokkasho-mura has been constructed and is undergoing test operation;
4. The United Kingdom plans to cease reprocessing on expiry of current contracts;
5. Some spent fuel is sent to the Russian Federation for reprocessing. Other fuel is stored awaiting a final decision.

TABLE A–6. EXTENDED AT REACTOR AND AWAY FROM REACTOR INTERIM STORAGE FOR SPENT FUEL

Country	Spent fuel storage
Argentina	Wet AFR
Belgium	Wet (Doel) and dry cask (Tihange) at NPP sites
Bulgaria	Wet AFR in use, dry AFR in construction
Brazil	Dry cask storage at NPPs
Czech Republic	Dry cask storage at NPPs
Canada	Dry cask or modular vault storage at reactor sites
Finland	Wet interim stores at NPPs
France	Wet store at reprocessing plants before reprocessing (following removal from reactor pools)
Germany	SF dry storage in casks at NPPs and centrally. Only one wet storage facility at the NPP site at Obrigheim
Hungary	Modular vault dry storage (MVDS) facility in the vicinity of the Paks NPP, operated by PURAM
Japan	Wet and dry cask storage at NPPs and dry cask storage centrally. Wet storage at reprocessing plants before reprocessing
Korea, Republic of	Dry cask storage at one NPP site
Lithuania	Dry cask storage at reactor site
Netherlands	AFR
Russian Federation	Wet storage at reprocessing facilities before reprocessing. A central dry storage vault has recently been opened for RBMK fuel
Slovakia	Wet central AFR at one reactor site
Spain	Dry cask storage at three NPPs Central dry vault storage under licensing at Villar de Cañas
Sweden	Central interim wet storage facility at one of the NPP sites
United Kingdom	AR storage for decay heat reduction prior to transfer off site Wet storage at reprocessing plant before reprocessing Dry cask storage at one NPP
United States of America	Dry cask storage at NPP and AFR sites

TABLE A–7. STATUS OF NATIONAL WASTE DISPOSAL PROGRAMMES

Country	VLLW	LLW	ILW	HLW	SF
Argentina	Planned engineered surface disposal, possibly combined with L&ILW-SL	Strategic Plan reference case is ‘monolithic near surface repository’ for wastes requiring <300 year isolation	Strategic Plan reference case is ‘deep geological repository’ for wastes requiring >300 year isolation	Strategic Plan reference case is ‘deep geological repository’	Decision for reprocessing or direct disposal of NPP SF to be made by 2030. Deep geological repository by 2060. For research reactor fuel the policy is to return to country of origin if possible or manage with NPP fuel otherwise.
Australia	Waste below exemption limits can be free released.	All federally owned wastes are currently stored. Site selection process underway for a national near surface disposal facility.	All wastes currently stored. National policy for long-term management currently under review.	N/A	Research reactor fuel only. Reprocessed internationally and returned to Australia as ILW for long-term management.
Austria	Policy is storage for decay, then free release.	Currently stored at a central facility at Seibersdorf. Required to move all wastes to a final repository by 2030 Currently no reference plans for repository. Options include use of a multinational regional repository.	Currently stored at a central facility at Seibersdorf. Required to move all wastes to a final repository by 2030 Currently no reference plans for repository. Options include use of a multinational regional repository.	N/A	Research reactor fuel only. Policy is to return fuel to country of origin.
Belgium	(included in L&ILW-SL category)	Currently stored at central facility. Planned surface disposal (at Dessel)	Currently stored at central facility. No formal decision yet. Reference planning case is deep disposal in ‘poorly indurated clay formation’ (Boom Clay or Ypresian Clay), colocated with HLW & SF	Currently stored at central facility. No formal decision yet. Reference planning case is deep disposal in ‘poorly indurated clay formation’ (Boom Clay or Ypresian Clay), colocated with ILW-LL & SF	Some reprocessed but moratorium on further reprocessing until long term policy developed. Reference planning case is deep disposal in ‘poorly indurated clay formation’ (Boom Clay or Ypresian Clay), colocated with ILW-LL & HLW

Country	VLLW	LLW	ILW	HLW	SF
Brazil	N/A	Reference option is national repository, either near surface or deep, depending on selected site.	Reference option is national deep repository	Reference option is national deep repository	No decision. Current policy is storage at reactor site pending outcome of future government review. Possibilities include deep disposal and reprocessing. For research and other reactors, return to country of origin where applicable.
Canada	Mainly managed as part of L&ILW. Near surface disposal facility under licensing for Canadian Nuclear Laboratories (CNL) VLLW/LLW	Existing storage by each major waste owner. Deep repository under licensing for Ontario Power Generation's (OPG's) L&ILW.	Existing storage by each major waste owner. Deep repository under licensing for OPG's L&ILW.	N/A.	Planned deep disposal at a volunteer host site in either crystalline or sedimentary rock.
China	Policy is storage for decay, then free release.	Existing and planned regional near surface repositories	For alpha bearing wastes, planned deep disposal colocated with HLW.	Planned deep disposal at a centralized facility	Policy is for reprocessing of NPP SF, except PHWR SF. Research reactor SF, planned deep disposal colocated with HLW.
Czech Republic	N/A	Existing surface disposal (at Dukovany power plant site) Existing underground cavern disposal (at Bratrství for NORM waste and at Richard for institutional wastes)	Reference case is deep disposal, colocated with HLW & SF	Reference case is deep disposal, colocated with SF & ILW-LL	Reference case is deep disposal (~2065), colocated with ILW-LL & HLW. However, other options (e.g. reprocessing and regional international repository) have not been excluded
Finland	Clearance for re-use, recycle or disposal in land fill.	Existing underground cavern disposal (at each reactor site)	Planned disposal with decommissioning wastes in extension of existing L&ILW repositories.	N/A	Construction licence received for deep repository at Olkiluoto, starting in 2022.

Country	VLLW	LLW	ILW	HLW	SF
France	Existing surface disposal (at Morvilliers)	Existing surface disposal (at Centre de l'Aube)	For ILW LL – Options currently under study. Reference assumption is deep disposal, possibly colocated with HLW For LLW LL (e.g. graphite) – reference assumption is dedicated shallow underground repository	Reference plan is deep disposal (ongoing investigations at Bure).	Policy is for reprocessing of NPP and most research reactor SF. Remaining research reactor fuels – reference plan is for deep disposal, possibly colocated with HLW.
Germany	N/A	Planned deep disposal for 'waste with negligible heat generation' (at Konrad)	Planned deep disposal for 'waste with negligible heat generation' (at Konrad)	Planned deep disposal for 'heat generating wastes' ~2030, site not yet decided	Planned deep disposal for NPP SF, site not yet decided For research reactor fuels, return to country of origin, or manage with NPP fuel.
Hungary	N/A	Existing near surface repository for institutional wastes at Püspökszilágy (now full but a safety enhancement programme is ongoing resulting in freeing capacity) Geological repository at Bátaapáti, underground chamber No 1 already operational, further chambers under construction.	Currently stored at site of origin and some ILW will be suitable for disposal in Bátaapáti. Financial reference plan for national repository for ILW-LL, HLW & SF.	Financial reference plan for national repository for ILW-LL, HLW & SF.	Financial reference plan for national repository for ILW-LL, HLW & SF. No decision on reprocessing vs disposal taken yet.
Italy	Clearance for re-use, recycle or disposal in land fill.	Currently stored at site of origin. Plan for national repository by 2020.	Currently stored at site of origin. Plan for national repository for ILW-LL, HLW & SF.	Plan for national repository for ILW-LL, HLW & SF.	Policy is for foreign based reprocessing of most SF (except certain research fuels) Plan for national repository for ILW-LL, HLW & SF.

Country	VLLW	LLW	ILW	HLW	SF
Japan	Existing demonstration surface disposal (at Tokai) Other surface facilities planned	Existing near surface disposal (at Rokkasho)	Planned deep, possibly colocated with HLW (effects of interactions with HLW currently under study)	Planned deep. Siting process under way.	Policy is for reprocessing of SF. Current policy under review in light of Fukushima accident.
Korea, Republic of	N/A	Rock cavern facility at Wolsong under construction.		Planned deep disposal for NPP SF and HLW, site not yet decided	Planned deep disposal for NPP SF and HLW, site not yet decided. Reprocessing option still open.
Lithuania	Landfill facility under construction	LILW-SL will disposed in the near surface repository, under licensing. Operation is planned for 2021. LILW-LL interim storage in Ignalina NPP. Disposal in planned deep geological repository.	LILW-SL will disposed in the near surface repository, under licensing. Operation is planned for 2021. LILW-LL interim storage in Ignalina NPP. Disposal in planned deep geological repository.	N/A	Stored in Ignalina NPP. Disposal in planned deep geological repository
Malaysia	Waste is stored for decay and released when radioactivity below then clearance level	Plan to have near surface disposal facility for low level waste. There is a closed near surface disposal facility for NORM waste.	N/A	N/A	N/A
Netherlands	Storage (at COVRA) followed by future free release	Existing 100 year storage (at COVRA), followed by planned deep disposal for all waste types in a single facility	Existing 100 year storage (at COVRA), followed by planned deep disposal for all waste types in a single facility	Existing 100 year storage (at COVRA), followed by planned deep disposal for all waste types in a single facility	Reprocessing Existing 100 year storage (at COVRA), followed by planned deep disposal for all waste types in a single facility.

Country	VLLW	LLW	ILW	HLW	SF
Romania	N/A	Institutional wastes, existing rock cavity (former uranium mine at Baita-Bihor) NPP wastes, reference plan is for a near surface repository at Saligny	Planned deep, possibly colocated with HLW & SF	Planned deep, possibly colocated with L&ILW-LL & SF	Reference case is deep geologic disposal. Various geologic formations being investigated.
Slovakia	Planned at Mochovce site.	Existing surface disposal at Mochovce.	Planned deep disposal, combined with HLW	Planned deep disposal, combined with ILW-LL	Interim SF dry sore facilities in operation. Planned deep disposal.
Slovenia	N/A	Planned near surface disposal adjacent to Krško NPP	Planned near surface disposal adjacent to Krško NPP.	Planned HLW disposal with SF in deep geological repository.	For NPP SF, reference plan is storage until ~2065, followed by deep disposal in either Slovenia or Croatia. Other options, such as multinational regional repository are also being considered. For research fuel, policy is to return to country of origin where possible, otherwise manage with NPP fuel.
South Africa	Existing surface disposal or decay storage and free release (e.g. recycle)	Existing surface disposal at Vaalputs.	No decision on disposal technology. Reference plan of medium to deep repository. May be combined with HLW in a single deep repository.	No decision on disposal technology. Reference plan of deep repository. May be combined with ILW-LL in a single deep repository.	No decision. Current policy is storage at reactor site pending outcome of government review. Possibilities include long-term surface storage, transmutation, deep disposal and reprocessing.

Country	VLLW	LLW	ILW	HLW	SF
Spain	Existing surface disposal (at El Cabril)	Existing surface disposal (at El Cabril)	Medium term reference plan is centralized storage along with HLW for 50 to 100 years. No decision taken on technology for final disposal. Reference planning assumption is deep, potentially colocated with HLW & SF	Medium term reference plan is centralized storage along with SF for 50 to 100 years. No decision taken on technology for final disposal. Reference planning assumption is deep, potentially colocated with ILW-LL & SF	Medium term reference plan is centralized storage for 50 to 100 years. No decision taken on technology for final disposal. Reference planning assumption is deep, potentially colocated with HLW & ILW-LL
Sweden	Existing surface disposal (at each nuclear site)	Existing underground cavern disposal (at SFR) Expansion of SFR to handle decommissioning wastes under licensing.	Interim storage at existing BFA Simpevarp site. Planned deep disposal starting in about 2045. Site not yet selected.	N/A	Planned deep repository at Forsmark site. Construction licence application filed in 2011. Expected operation in 2025.
Switzerland	N/A	Planned deep disposal, possibly colocated with repository for long lived wastes and HLW.	Planned deep, colocated with HLW & SF	Planned deep, colocated with ILW-LL & SF	Some reprocessed and some planned for direct deep disposal (utilities could choose option, but as of 2006, there is a 10 year moratorium on reprocessing, which was prolonged for another 10 years in 2016)
United Kingdom	Conventional surface land fill facilities	Existing surface disposal (at LLWR&Dounreay) Other facilities may be developed if required.	Current practice is 'passively safe' interim storage at major nuclear sites. Reference future plan is deep disposal, colocated with HLW	Current practice is 'passively safe' interim storage at major nuclear sites. Reference future plan is deep disposal, colocated with ILW-LL	Mostly reprocessed. Decision of whether to reprocess or dispose left to waste owner, based on economics. If disposed, would be in a single collocated deep facility.

Country	VLLW	LLW	ILW	HLW	SF
United States of America	A portion of Class A waste is equivalent to VLLW; such waste is disposed in an existing commercial surface disposal (at Clive, Utah)	Existing commercial surface disposal (at Clive UT, Hanford WA, Barnwell SC, Andrews TX)	Currently ILW-LL (called 'greater than class C' or GTCC) is an orphan with no available disposal route. (Stored at various sites). Alternatives currently under study. Options include geologic repository, intermediate depth boreholes, and enhanced near surface facilities. Defense related TRU wastes disposed at existing deep facility (at WIPP)	Licensing activities for Yucca Mountain continue within funding constraints as appropriated by Congress; a strategy is being pursued with plans to develop pilot interim storage facility, consolidated storage facility and a geologic repository	Licensing activities for Yucca Mountain continue within funding constraints as appropriated by Congress; a strategy is being pursued with plans to develop a pilot interim storage facility, consolidated storage facility, and a geologic repository

TABLE A–8. NATIONAL STRATEGIES FOR DISUSED SEALED SOURCE MANAGEMENT

Country	Strategy for DSRS management
Albania	As part of this licensing procedure, the applicant must have a written commitment from the foreign supplier, where the latter agrees to take back the source if disused. If it turns out that the supplier is unable to respect his commitment, e.g. in case of bankruptcy, the user or holder is obliged to take all necessary administrative steps to send his disused source to any other supplier of radioactive sources inside or outside the country at a radioactive waste management facility.
Argentina	The storage of radioactive disused sources is allowed only in the facility as long as the holder of the license is able to demonstrate that they have a specific program for its reuse or to use it in replacement of another source existing at the site. In case the license holder does not have an adequate place for temporary storage of the radioactive sources or in case of any other situation determined by the ARN, the sources must be sent to a safe storage site.
Armenia	Final decision on DSS management option is to be specified in the 'National Strategy for the SNF and RW management'. The 'return to the country of origin' is under consideration.
Australia	Owner of the source must have arrangement with the supplier for return at the end of useful life. Allows re-entry of disused sources.
Belarus	The user/holder can either transport disused sealed sources to the national waste management organisation as waste or can return them to the producer.
Belgium	The user/holder can either transport disused sealed sources to the national waste management organisation as waste or can return them to the producer.
Bosnia and Herzegovina	Disused sealed sources are returned to supplier or stored in eight interim storage locations. All DSRs should be returned to the supplier in long-term policy.
Brazil	Disused sealed sources are returned to supplier or kept in interim storage. A programme to collect all disused sealed sources has been instituted.
Canada	Disused sealed sources may be sent to a licensed waste management facility or returned to its country of origin. The re-entry of previously exported sealed sources is permitted.
Chile	Disused sealed sources in Chile must be returned to its supplier or be managed as radioactive waste
Croatia	Each disused sealed source firstly has to be offered to those who would use it for other purposes. If such users do not exist, the source has to be transported to the central national repository. The dismantling of the source and the transport to the repository can be performed only by authorized technical service and in the prescribed manner.
Cyprus	All disused source to be returned to the supplier/manufacturer, outside Cyprus.
Czech Republic	Disused sealed sources are disposed of in engineered near surface repositories or stored. Re-entry of sources manufactured nationally is allowed.
Denmark	Disused sealed sources are returned to the manufacturer or management by DD.
Estonia	Disused sealed sources are either returned to the manufacturer or sent to the national waste management organisation. In Estonia neither manufacturing nor re-manufacturing of sealed sources takes place.
Finland	Options are to have an agreement with the provider for returning the source or transfer to national authorities for storage pending disposal. Re-entry of sources manufactured nationally is allowed.
France	A study has shown that approximately 83% of the 2 million disused sealed sources in the national inventory can be disposed of in a shallow disposal facility, 15% could go for engineered near surface disposal and 2% for deep geological disposal.

Country	Strategy for DSRS management
Ghana	Disused sealed sources are encouraged to be returned to the original supplier or manufacturer.
Georgia	All existed DSRS have Soviet origin and kept in the CSF. In case of import of new source, importer will receive the permit only in case if he warrants sending of the source back when it becomes unused.
Germany	High active disused sealed sources have to be returned to the manufacturer, the carrier or another licensee or have to be disposed of as radioactive waste or kept in interim storage. Manufacturers and carriers are obliged to take the sources back.
Hungary	Disused sources are disposed of at the Radioactive Waste Treatment and Disposal Facility at Püspökszilágy. Hungarian manufacturers of radioactive sources are required to take back radioactive sources produced by them if users within Hungary or abroad request it. These sources are either re-furbished or disposed of in the facility at Püspökszilágy
Ireland	Return of disused sealed sources to the manufacturer is the main management route. Some legacy sources are stored pending a solution.
Japan	Most sources in Japan are imported and the sources with long half-life and high activity are sent back to the manufacturers. The remainder are stored by the authorities. The re-entry of previously exported sealed sources is permitted.
Korea, Republic of	Disused sealed sources have to be sent to the national authority for treatment and storage unless they are returned to the supplier. The re-entry of previously exported sealed sources is permitted.
Kazakhstan	Disused sealed sources are allowed for re-entry if it has accepted that they should be returned to a qualified manufacturer.
Latvia	Disused sealed sources must be return to the country of origin or long term storage and disposal
Lithuania	Disused sealed sources must be sent to the national radioactive waste storage facility (foreseen disposal in deep geological repository), or returned to the country of origin. No sources are manufactured in Lithuania.
Malta	Disused sealed sources are currently stored at various governmental and private facilities and are subject to RPB inspection. The National Framework envisages; taking back arrangements by the supplier when new sources are purchased, exporting of sources whenever possible, exploring disposal option within Malta.
Montenegro	Any disused sealed radioactive source is returned to the supplier if possible. If not, is stored in the radioactive waste storage facility. No manufacturing or processing (repair) of sealed sources is being done.
Morocco	Disused sealed sources have two options, being returned to the supplier, or being transferred the disused source to the central waste management facility (CNESTEN).
Nigeria	Disused sealed sources should be repatriated to the manufacturer/supplier.
Norway	Strict enforcement of the return to supplier route. Otherwise disused sealed sources are sent for treatment and storage at the national facility. The re-entry of previously exported disused sealed sources is permitted
Oman	All disused sealed radioactive sources are required by the law to be returned to the manufacturer.
Poland	Disused sealed sources must return to manufacturer or repository.
Portugal	Disused sealed sources must return to manufacturer or repository.
Republic of	Disused sealed sources are returned to manufacturer or disposal in Radioactive Waste Disposal

Country	Strategy for DSRS management
Moldova	Enterprise.
Russian Federation	Disused sealed sources are returned to suppliers within the Russian Federation and reporocessed or they are sent for storage/disposal to the national facility. Re-entry of sources manufactured nationally is allowed.
Slovakia	Disused sealed sources must be returned to the foreign producer or supplier. Any other disused sealed sources are either disposed of in the near surface repository or stored for future disposal. No sources are produced nationally.
Slovenia	Primarily disused sealed sources are returned to suppliers or producers. if not then stored in the Central Storage for Radioactive Waste. Some are returned to foreign suppliers. No sources are produced nationally.
South Africa	Disused sealed sources are returned to manufacturer.
Spain	The licensee is obliged to return disused radioactive sources to the supplier or, if this is not possible, to have them managed by the national waste management organisation. No sealed sources are manufactured in Spain.
Sweden	Disused sealed sources are returned to the supplier or sent to the national waste management organisation for interim storage. The re-entry of disused sealed sources is permitted.
The former Yugoslav Republic of Macedonia	The disused sealed radioactive sources, imported in the former Yugoslav Republic of Macedonia shall be returned to the manufacturer or the supplier. No manufacturing or remanufacturing of sealed radioactive sources takes place inside the country.
United Kingdom	Disused sealed sources must be transferred to the supplier or to a recognised storage facility. Re-entry of sources manufactured nationally is allowed.
United States of America	Licensees possessing disused sealed sources are responsible for properly storing the sources until a disposal facility or alternative disposition path (such as recycling) is available. Disposal options exist for many disused sources, although capability is needed for certain higher activity sources.
Viet Nam	Disused sealed sources are returned to the manufacturer or stored at NRI.

TABLE A–9. COUNTRY GROUPINGS

	Africa	E Europe	W Europe	Far East	N America	L America	ME&SA	SEA & P	EU Member	OECD NEA	IAEA Member	Joint Convention
Afghanistan							X				X	
Albania		X									X	X
Algeria	X										X	
Andorra			X									
Angola	X										X	
Argentina						X					X	X
Armenia		X									X	X
Australia								X		X	X	X
Austria			X						X	X	X	X
Azerbaijan		X									X	
Bahamas						X					X	
Bahrain							X				X	
Bangladesh							X				X	
Belarus		X									X	X
Belgium			X						X	X	X	X
Belize						X					X	
Benin	X										X	
Bolivia, Plurinational State of						X					X	
Bosnia & Herzegovina		X									X	X
Botswana	X										X	X
Brazil						X					X	X
Brunei Darussalam								X			X	
Bulgaria		X							X		X	X
Burkina Faso	X										X	

	Africa	E Europe	W Europe	Far East	N America	L America	ME&SA	SEA & P	EU Member	OECD NEA	IAEA Member	Joint Convention
Burundi	X										X	
Cambodia				X							X	
Cameroon	X										X	
Canada					X					X	X	X
Central African Republic	X										X	
Chad	X										X	
Chile						X					X	X
China				X							X	X
Colombia						X					X	
Congo	X										X	
Costa Rica						X					X	
Côte d'Ivoire	X										X	
Croatia		X							X		X	X
Cuba						X					X	
Cyprus			X						X		X	X
Czech Republic		X							X	X	X	X
Democratic Republic of the Congo	X										X	
Denmark			X						X	X	X	X
Dominica						X					X	
Dominican Republic						X					X	
Ecuador						X					X	
Egypt	X										X	
El Salvador						X					X	
Eritrea	X										X	

	Africa	E Europe	W Europe	Far East	N America	L America	ME&SA	SEA & P	EU Member	OECD NEA	IAEA Member	Joint Convention
Estonia		X							X		X	X
Ethiopia	X										X	
Fiji								X			X	
Finland			X						X	X	X	X
France			X						X	X	X	X
Gabon	X										X	X
Georgia		X									X	X
Germany			X						X	X	X	X
Ghana	X										X	X
Greece			X						X	X	X	X
Guatemala						X					X	
Haiti						X					X	
Holy See			X								X	
Honduras						X					X	
Hungary		X							X	X	X	X
Iceland			X							X	X	X
India							X				X	
Indonesia								X			X	X
Iran, Islamic Republic of							X				X	
Iraq							X				X	
Ireland			X						X	X	X	X
Israel							X				X	
Italy			X						X	X	X	X
Jamaica						X					X	
Japan				X						X	X	X
Jordan							X				X	X

	Africa	E Europe	W Europe	Far East	N America	L America	ME&SA	SEA & P	EU Member	OECD NEA	IAEA Member	Joint Convention
Kazakhstan		X									X	X
Kenya	X										X	
Korea, Republic of				X						X	X	X
Kuwait							X				X	
Kyrgyzstan		X									X	X
Lao People's Democratic Rep				X							X	
Latvia		X							X		X	X
Lebanon							X				X	
Lesotho	X										X	
Liberia	X										X	
Libya	X										X	
Liechtenstein			X								X	
Lithuania		X							X		X	X
Luxembourg			X						X	X	X	X
Madagascar	X										X	
Malawi	X										X	
Malaysia								X			X	
Mali	X										X	
Malta			X						X		X	X
Marshall Islands								X			X	
Mauritania	X										X	X
Mauritius	X										X	X
Mexico						X				X	X	
Monaco			X								X	
Mongolia				X							X	

	Africa	E Europe	W Europe	Far East	N America	L America	ME&SA	SEA & P	EU Member	OECD NEA	IAEA Member	Joint Convention
Montenegro		X									X	X
Morocco	X										X	X
Mozambique	X										X	
Myanmar								X			X	
Namibia	X										X	
Nepal							X				X	
Netherlands			X						X	X	X	X
New Zealand								X			X	
Nicaragua						X					X	
Niger	X										X	
Nigeria	X										X	X
Norway			X							X	X	X
Oman							X				X	X
Pakistan							X				X	
Palau								X			X	
Panama						X					X	
Papua New Guinea								X			X	
Paraguay						X					X	
Peru						X					X	X
Philippines				X							X	
Poland		X							X	X	X	X
Portugal			X						X	X	X	X
Qatar							X				X	
Republic of Moldova		X									X	
Romania		X							X		X	X
Russian		X								X	X	X

	Africa	E Europe	W Europe	Far East	N America	L America	ME&SA	SEA & P	EU Member	OECD NEA	IAEA Member	Joint Convention
Federation												
Rwanda	X										X	
San Marino			X								X	
Saudi Arabia							X				X	X
Senegal	X										X	X
Serbia		X									X	
Seychelles	X										X	
Sierra Leone	X										X	
Singapore								X			X	
Slovakia		X							X	X	X	X
Slovenia		X							X	X	X	X
South Africa	X										X	X
Spain			X						X	X	X	X
Sri Lanka							X				X	
Sudan	X										X	
Swaziland	X										X	
Sweden			X						X	X	X	X
Switzerland			X							X	X	X
Syrian Arab Republic							X				X	
Tajikistan		X									X	X
Tanzania	X										X	
Thailand								X			X	
The former Yugoslav Republic of Macedonia		X									X	
Togo	X										X	
Trinidad & Tobago						X					X	

	Africa	E Europe	W Europe	Far East	N America	L America	ME&SA	SEA & P	EU Member	OECD NEA	IAEA Member	Joint Convention
Tunisia	X										X	
Turkey			X							X	X	
Turkmenistan		X										
Uganda	X										X	
Ukraine		X									X	X
United Arab Emirates							X				X	X
United Kingdom			X						X	X	X	X
United States of America					X					X	X	X
Uruguay						X					X	X
Uzbekistan		X									X	X
Venezuela, Bolivarian Republic of						X					X	
Viet Nam				X							X	X
Yemen							X				X	
Zambia	X										X	
Zimbabwe	X										X	

TABLE A–10. LIQUID RADIOACTIVE WASTE IN STORAGE (AS OF 31 DECEMBER 2013)

	VLLW (m^3)	LLW (m^3)	ILW (m^3)	HLW (m^3)	Total (m^3)
Armenia	-	-	2 460[1]	-	2 500
Bulgaria	-	7 000	-	-	7 000
Russian Federation	-	53 325 000[2]	6 251 000	2 430 000	62 006 000
United States of America	-	-	-	356 000	356 000

TABLE A–11. LIQUID RADIOACTIVE WASTE DISPOSED BY DEEP INJECTION (AS OF 31 DECEMBER 2013)

	VLLW (m^3)	LLW (m^3)	ILW (m^3)	HLW (m^3)	Total (m^3)
Russian Federation	-	39 567 000	8 628 000	68 000	48 262 880
United States of America	-	17 300[3]	-	-	17 300

[1] This figure includes 160 m^3 of spent ion exchange resins which are classified as HLW under the Armenian national classification system but are ILW in accordance with IAEA General Safety Guide GSG-1 because it is not heat-generating waste.
[2] Based on the Russian National Reports to the Joint Convention (through 2012) [32, 33].
[3] From 1965 to 1986, liquid waste slurred with cement was injected into a rock formation at approximately 300 m depth at the Oak Ridge National Laboratory. This approach was called ‘Hydrofracture’.

TABLE A–12. URANIUM MINING AND MILLING WASTES (AS OF 31 DECEMBER 2013)

	Storage (tonnes)	Disposal (tonnes)
Africa	452 000 000	NR[4]
Eastern Europe	10 000 000	2 000 000
Western Europe	4 800	50 000 000
Far East	NR	NR
North America	233 000 000	248 000 000
Latin America	20 000 000	NR
Middle East & South Asia	110	NR
Southeast Asia & Pacific	59 000 000	NR
Global Total	775 000 000	300 000 000
Joint Convention Contracting Parties	774 000 000	300 000 000
EU Member States	10 000 000	52 000 000
OECD NEA Member States	292 000 000	300 000 000

[4] "NR" indicates "none reported"

TABLE A–13. STATUS OF RADIOACTIVE WASTE DISPOSAL FACILITIES (AS OF 31 DECEMBER 2013)

Country	Type[5]	Construction *number*/capacity (m^3)		Operational *number*/capacity (m^3)		Closed *number*/capacity (m^3)	
Argentina	NSD	-	-	*3*	2 060	-	-
Australia	NSD	-	-	*1*	124	*3*	455 718
Belarus	NSD	-	-	*1*	820	*12*	254 290
Brazil	NSD	-	-	-		*2*	3 500
China	NSD	*1*	-	*2*	440 000	-	-
Czech Republic	NSD	-	-	*3*	64 500	*1*	1 690
Finland	GD	-	-	*2*	18 000	-	-
France	NSD	-	-	*2*	1 650 000	*1*	527 225
Germany	GD	*1*	303 000	-		*2*	102 000
Hungary	NSD	-	-	*1*	5 040	-	-
	GD	*3*	22 646	*1*	6 416	-	-
India	NSD	-	-	*1*	57 000	-	-
Israel	NSD	-	-			*1*	5 000
Japan	NSD	-	-	*3*	82 520	-	-
Korea, Republic of	GD	-	-	*1*	160 000	-	-
Latvia	NSD	-	-	*1*	1 900	-	-
Lithuania	NSD	*1*	60 000	-	-	-	-
Mexico	NSD	-	-	-	-	*1*	20 896
Norway	NSD	-	-	*2*	1 575	-	-
Pakistan	NSD	-	-	*1*	180	-	-
Poland	NSD	-	-	*1*	16 600	-	-
Romania	NSD	-	-	*1*	5 000	-	-
Slovakia	NSD	-	-	*1*	22 320	-	-
South Africa	NSD	-	-	*1*	-	*4*	27 772
Spain	NSD	-	-	*1*	170 000	-	-

[5] NSD – Near Surface Disposal/GD – Geological Disposal

Country	Type[5]	Construction *number*/capacity (m^3)		Operational *number*/capacity (m^3)		Closed *number*/capacity (m^3)	
Sweden	NSD	-	-	*4*	-	-	-
	GD	-	-	*1*	63 000	-	-
United Kingdom	NSD	-	-	*2*	180 000	*1*	3 400
Ukraine	NSD	-	-	*16*	-	-	-
United States of America	NSD	*1*	-	*16*[6]	5 890 000	*5*	5 620 000
	GD	-	-	*1*	175 600	-	-

[6] Distributed as follows: Commercial—Waste Control Services, TX (1); Richland, WA (1); Clive, UT (1); Barnwell, SC (1); Government-Operated—Hanford (3); Idaho (2); Nevada (2); Savannah River (2); Oak Ridge National Laboratory (1); Los Alamos National Laboratory (1); and Waste Control Services Federal Cell (1).

TABLE A–14. CURRENT AND FUTURE AMOUNTS OF SPENT FUEL IN STORAGE AND DISPOSED IN SELECTED COUNTRIES (t HM)

Country	Date	Spent fuel in storage (t HM)	Spent fuel reprocessed or recycled (t HM)	Spent fuel disposed (t HM)
Canada	2013	47 500	0	0
	2030	NA	0	NA
	2050	97 500	0	36 000
China	2013	4 371	397	0
	2030	29 900	10 400	0
	2050	76 900	56 600	0
Finland	2013	1 984	0	0
	2030	3 800	0	400
	2050	6 100	0	1 700
France	2013	14 000	No value	0
	2030	17 000	No value	0
	Long term forecast	0	No value	0
Germany	2013	8 226	6 850	0
	2030	10 500	6 850	0
	2050	10 500	6 850	0
Hungary	2013	1 117	0	0
	2030	2 026	0	0
	2050	3 257	0	0
Indonesia	2013	0.3	0	0
	2030	0.7	0	0
	2050	1.5	0	0
Korea, Republic of	2013	13 808		
	2030	26 574		
	2050	35 907		
Lithuania	2013	2 416	0	0
	2030	2 416	0	0
	2050	2 416	0	0

Country	Date	Spent fuel in storage (t HM)	Spent fuel reprocessed or recycled (t HM)	Spent fuel disposed (t HM)
Spain	2013	4 592	2 060	0
	2030	6 794	60	0
	2050	6 794	60	0
Sweden	2013	6 298	145	
	2030	9 500	145	
	2050	4 000	145	8 000
United Kingdom	2013	5 328	No value	
	Long term	7 539		
United States of America	2014	76 528	0	0
	2030	114 428	0	0
	2050	146 228		

TABLE A–15. FORECASTS OF VOLUMES OF DIFFERENT TYPES OF WASTE IN STORAGE AND DISPOSED IN SOME COUNTRIES (AS DISPOSAL VOLUMES)

Country	Time	HLW (m^3) stored	HLW (m^3) disposed	ILW (m^3) stored	ILW (m^3) disposed	LLW (m^3) stored	LLW (m^3) disposed	VLLW (m^3) stored	VLLW (m^3) disposed
Canada	2013			35 000		2 353 000			
	2030	NA		NA		NA			
	2050			43 000	25 000	2 325 000	175 000		
China	2013		0			31 975	10 948		
	2030		0			31 000	70 400		
	2050		8 000			55 200	264 100		
Estonia	2013					3 580			
	2030					7 000			
	2050					7 000			
France	2013	3 200	0	130 000	0	70 000	810 000	190 000	250 000
	2030	5 500	0	170 000	0	100 000	1 100 000	190 000	910 000
Germany	2013	541	0	13 898	8 375	123 462	75 378	0	0
	2030	1 125	0	17 375	16 400	153 000	147 600	0	0
	2050	1 125	0	2 375	36 400	18 000	327 600	0	0
Hungary	2014	98	0	968	2 158	1 245	2 775	553	1 233
	2030	205	0	706	6 556	907	8 429	403	3 746
	2050	225	0	790	8 036	1 015	10 332	451	4 592
Indonesia	2013	0	0	84	0	173	0	74	0
	2030	0	0	134	0	275	0	118	0
	2050	0	0	265	0	545	0	233	0
Latvia	2013					20	871		
	2030					30	1 100		
	2050					60	2 000		
Lithuania	2013			0		5 000	14 000	1 000	0
	2030			5 000		3 000	50 000	2 000	30 000
	2050			10 000		0	100 000	0	60 000
Spain	2013	0	0	27	0	7 494	29 602	5 064	7 612

Country	Time	HLW (m^3) stored	HLW (m^3) disposed	ILW (m^3) stored	ILW (m^3) disposed	LLW (m^3) stored	LLW (m^3) disposed	VLLW (m^3) stored	VLLW (m^3) disposed
	2030	No value	No value	No value	0	No value	No value	No value	No value
	2050	0	0	No value	0	No value	50 000	No value	120 000
Sweden	2012	0	0	8 000	0	6 958	34 943	2 058	19 659
	2030	0	0	12 000	0	7 000	90 000	2 000	No value
	2050	0	0	10 000	5 000	7 000	150 000	2 000	No value
United Kingdom	2013	2 030		104 000		69 600		5 410	
	Long term	0	1 410	0	462 000	0	1 150 000	0	3 110 000
United States of America	2014	364 208	0	53 643	91 000	32 900	17 003 100	No value	2 724 000
	2030	240 208	0	No value	TBD	65 000	20 954 800	No value	3 384 000
	2050	23 008	No value	No value	145 000	65 000	22 984 600	No value	4 158 000

KEY ASSUMPTIONS RELATING TO THE ABOVE FORECASTS AS NOTED IN THE NATIONAL PROFILES

Canada

LLW in 2050 is foreseen to be mainly contaminated soil which will remain at its present location.

France

The 9 first generation reactors (6 gas cooled, one pressurized waste reactor, one heavy water and one prototype fast reactor) are currently under decommissioning, as are several research reactors. Decommissioning of the primary circuits of the gas cooled reactors and associated production of graphite LLW-LL is expected to begin around 2025. For the second generation reactors an average service life of 50 years is assumed for all 58 reactors, the first is expected to cease operation in 2018.
All spent fuel will be reprocessed in the currently operating fuel reprocessing plants. Fissile materials separated will be reused in the current nuclear power fleet or in a future fleet. A spent fuel reprocessing flow of around 1000 tonnes per year is assumed.
The GSG-1 waste classes ILW and LLW categories do not exist in the French classification scheme; the numbers are therefore provided only for purposes of comparison.

Germany

According to German atomic law, the last NPP will be shutdown at the end of 2022. All NPP will be dismantled to 'green field' and the waste will be disposed in the Konrad repository. The forecast in the present report is based on the dismantling procedure foreseen by German utilities and the successive dismantling over 15–20 years after the spent fuel has been removed from the reactor.

The commissioning of the Konrad repository for waste with negligible heat generation will not occur before 2022. An average disposal rate of 10 000 m3 per year is assumed, beginning from 2023. A repository for heat generating waste is not assumed to commence operation until 2050, and the radioactive waste stored in the Asse II mine is considered as disposed, in this forecast.
The transformation matrix is only applicable for the year 2013.

Hungary

Pending decision on the closure of the fuel cycle, SF is not considered waste in Hungary. The waste amounts include all institutional waste and NPP operational and decommissioning waste. In case of NPP it was assumed that the already existing 4 units will be shut down in 2032-2037 and the two new units will start operating in 2025 and 2026.
The Hungarian national waste inventory is based on the previous IAEA waste categorization using categories LILW (LILW-SL, LILW-LL) and HLW. Currently the VLLW category does not exist in Hungary. All the wastes that could potentially fall into this category are included in the LLW class.
For institutional waste and NPP operation waste, it was assumed that 20% 45% and 35% of the total LILW volume correspond to VLLW, LLW and ILW, respectively. Regarding HLW, all the wastes to be disposed of in a future deep geological repository, so practically all the high level and/or long lived wastes, are included.

Indonesia

The forecast provided assumes no nuclear plants will be in service prior to 2050. Spent fuel and the majority of radioactive waste is assumed to be generated from ongoing operation of the current research reactor or its replacement by an equivalent facility, with 24 fuel elements being discharged from the reactor each year. In addition, five 950 litre concrete waste packages and 40 200 litre drums of conditioned waste are produced each year from processing of raw radioactive waste.

Spain

A 40 year service lifetime for the 7 operating NPPs. Following shutdown, total dismantling of the LWR NPPs to be initiated 3 years after their definitive shutdown (immediate dismantling strategy).
The spent fuel in Spain currently arises from the operation of the eight operating nuclear reactors, located at six sites, and from the decommissioning of two shutdown reactors. There are also other nuclear facilities in operation (e.g. the Juzbado fuel manufacturing facility, solid radioactive waste disposal facility, etc.). The General Radioactive Waste Plan defines a basic reference scenario for the National Radioactive Waste Management programme that establishes general assumptions in this regard.

Sweden

The present 10 operating reactors are assumed to operate for 60 years. No new NPPs are forecast to come into service.
By 2030 the disposal capacity for the repository for operational waste (SFR) will have been increased to accommodate waste from the decommissioning of the current generation of power plants. The repository for spent fuel is expected to be in operation around 2030 and the repository for ILW will have been constructed before 2050, thus enabling the disposal of ILW.

United Kingdom

Future waste arisings are radioactive materials that waste producers forecast will be declared as waste at some specified time in the future. Most of the radioactivity already exists (for example in reactor structures), but will only arise as waste during the decommissioning of nuclear facilities and site clean-up. Other radioactive waste (that from future planned operations) has yet to be produced. In general the volumes of future arisings reported reflect current waste management practices.
Long-term forecasts also takes into account net of HLW exports to overseas customers.

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