Department for Energy Security & Net Zero

Consultation:

Part I

UK policy proposals for managing radioactive substances and nuclear decommissioning

Closing date: 24 May 2023

Department for Energy Security & Net Zero

Scottish Government
Riaghaltas na h-Alba

Department of Agriculture, Environment and Rural Affairs
www.daera-ni.gov.uk

Llywodraeth Cymru
Welsh Government

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Foreword

The UK Government and devolved administrations have a common goal to reduce greenhouse gas emissions to net zero in the coming decades. We do, however, have different approaches to achieving this goal when it comes to low carbon energy generation.

The UK and Welsh Governments see an important role for new nuclear power facilities, including advanced modular nuclear reactors and small modular nuclear reactors in helping us reach net zero carbon emissions by 2050 and to increase our energy security. The Energy Security Strategy,[1] sets out an ambition to increase plans for deployment of nuclear power of up to 24 gigawatts.

The Scottish Government has adopted a net zero emissions target by 2045. Its focus in relation to power generation is on promoting renewable electricity generation such as wind and solar. The Department of Agriculture, Environment and Rural Affairs has introduced a Northern Ireland Executive Climate Change Bill in the Northern Ireland Assembly which includes provisions for emissions reduction targets for Northern Ireland. Northern Ireland does not have any nuclear power stations.

When it comes to managing the radioactive waste that has accumulated through the use of nuclear technology over the last 70 years and the waste that continues to arise through its many uses, all four nations of the UK share common goals. We are clear that we must strive to keep the creation of radioactive waste to a minimum. We must strive to find the most cost-effective and sustainable solutions for its long-term safe management. We must strive to reduce the burden for future generations of managing the radioactive waste that has already accumulated or has yet to be generated, for example, through nuclear decommissioning and clean-up activities.

In the UK we have a long history of using radioactive materials to treat and diagnose serious illnesses, to deliver research and development and in industrial processes as well as for generating low carbon electricity. As a result, the UK has been producing and managing radioactive waste for decades.

The UK Government and devolved administrations are working together to produce a UK-wide policy framework to give a clearer and more consistent direction to those using radioactive materials and those responsible for managing radioactive waste. In doing so we aim to set out clearly those policies that are pursued jointly by the UK Government and devolved administrations and the separate policies that apply in each nation.

[1] British Energy Strategy. Available at: https://www.gov.uk/government/publications/british-energy-security-strategy

The last overarching policy document on the management of radioactive waste, *Command Paper 2919, Review of Radioactive Waste Management Policy: Final Conclusions*,[2] was published in 1995. Since then, the regulatory and policy landscape has changed significantly, not least with the advent of devolution, the creation of new regulatory bodies and the creation of the Nuclear Decommissioning Authority. In addition, some chapters in Command Paper 2919 have been replaced with new policy documents, and new policies have been developed that did not originally feature in Command Paper 2919, further fragmenting the policy landscape.

Scientific and technical advances have been made in the field of nuclear decommissioning over the last couple of decades, alongside significant progress in the decommissioning of the UK's nuclear facilities and sites. There have also been similar advances in the understanding of the management, including disposal of radioactive waste. The UK radioactive waste management landscape is changing, as the decommissioning and clean-up of the current nuclear infrastructure and decommissioning across the non-nuclear sector progresses.

Furthermore, substantial changes have been made to the uses of radioactive substances in non-nuclear sectors, with the addition of new wide-ranging applications such as in medical imaging, radiotherapy, and industrial measurement.

It is therefore timely to consolidate and update policies on managing radioactive substances and nuclear decommissioning into a single coherent policy framework to replace Command Paper 2919 and to include those polices which have superseded elements of it. In doing so we are also taking the opportunity to improve and update some of our policies, where appropriate.

The consultation is in two parts. In Part I we are seeking views on the policies we are proposing to change. In Part II we provide a draft of the proposed UK-wide policy framework as it would appear if the policy changes proposed in Part I were implemented.

If implemented, we expect the proposals in this consultation and the revised policy framework to reduce unnecessary burden, unlock more innovation and sustainable ways of working in managing and disposing of radioactive waste from the nuclear and non-nuclear sectors. Our proposals would facilitate and encourage earlier and more cost-effective decommissioning of our nuclear facilities, freeing up land for other uses, whilst maintaining high standards of safety, security and environmental protection.

[2] UK Government (1995). Command Paper 2919, Review of Radioactive Waste Management Policy: Final Conclusions. Available at: https://www.gov.uk/government/publications/radioactive-waste-management-policy-review-1994

Contents

1

General information

Why are we consulting?

1.1 The UK Government and the devolved administrations are proposing a UK-wide policy framework that draws together, in a single point of reference, policies on the management of radioactive substances and nuclear decommissioning. This is set out in Part II of the consultation.

1.2 We are also proposing to amend, update and clarify some of these policies with the aim of driving improvements in nuclear decommissioning and clean-up programmes and the management of radioactive materials, and the waste they generate. These are set out here in Part I of the consultation.

Consultation details

Issued: Department for Energy Security and Net Zero

Respond by: 24/05/2023

Enquiries to:

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Nuclear Decommissioning and Radioactive Substances Policy Team

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Consultation reference: Managing Radioactive Substances and Nuclear Decommissioning

Audiences:

1.3 We wish to ensure that our consideration of the proposals is informed by a range of views. While we welcome views from all interested parties, we expect the following stakeholders will have a particular interest:

- organisations responsible for nuclear decommissioning and clean-up activities;
- organisations responsible for the safe and secure management of radioactive substances including, nuclear materials;
- radioactive waste owners and producers (from the nuclear and non-nuclear sectors);
- the decommissioning and radioactive waste management supply chain;
- regulators;
- non-governmental organisations;
- local authorities; and
- local communities in the vicinity of existing nuclear sites.

Territorial extent:

1.4 This is a UK-wide consultation. Some of the policy areas included in this consultation are reserved, meaning it is for the UK Government to set policy and the UK Parliament to legislate for the whole of the UK. Other policy areas are devolved, with the legislatures and devolved administrations in Scotland, Wales and Northern Ireland being responsible for policy and legislation in their nation. In some areas of devolved policy making the UK Government and devolved administrations have worked together to produce policy that is UK-wide. In other areas the four nations of the UK have developed separate, though largely consistent policies.

How to respond

1.5 Specific questions for respondents to consider are included throughout both Parts I and II of the consultation. Questions on the specific proposals for policy changes are also listed together on page 48 here in Part I. Your response will be most useful if it is framed in direct response to the questions posed, though further comments and evidence are also welcome. When responding, please state whether you are responding as an individual or representing the views of an organisation. If you are responding on behalf of an organisation, please make it clear who the organisation represents.

1.6 When considering responses to this consultation, the UK Government and devolved administrations will give greater weight to responses that are based on argument and evidence, rather than simple expressions of support or opposition.

1.7 Where possible, responses should be submitted electronically via the e-consultation available at https://beisgovuk.citizenspace.com/energy-security/radioactive-substances-nuclear-decommissioning

1.8 Once this consultation has closed, the UK Government and devolved administrations will consider comments received and publish a summary of the consultation responses and final policy decisions.

Respond online at: https://beisgovuk.citizenspace.com/energy-security/radioactive-substances-nuclear-decommissioning

or

Email to: RSNDPolConsult@beis.gov.uk

Write to

Dawn Armstrong

Nuclear Decommissioning and Radioactive Substances Policy Team

Department for Energy Security and Net Zero

1 Victoria Street

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SW1H 0ET

Email: RSNDPolConsult@beis.gov.uk

A response form is available on the GOV.UK consultation page: www.gov.uk/government/consultations/managing-radioactive-substances-and-nuclear-decommissioning

Confidentiality and data protection

1.9 Information you provide in response to this consultation, including personal information, may be disclosed in accordance with UK legislation (the Freedom of Information Act 2000, the Data Protection Act 2018, the Environmental Information Regulations 2004), the Freedom of Information (Scotland) Act 2002 and the Environmental Information (Scotland) Regulations 2004.

1.10 If you want the information that you provide to be treated as confidential please tell us, but be aware that we cannot guarantee confidentiality in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not be regarded by us as a confidentiality request.

1.11 We will process your personal data in accordance with all applicable data protection laws. See our Privacy Notices Responding to a consultation and Responding online to a consultation via the BEIS Consultation Hub.

1.12 Further information explaining your rights and the information you are entitled to under the Data Protection Act 2018 and UK General Data Protection Regulation (UK GDPR). The organisations with whom we will share your response to this consultation can be found within the privacy notice at Annex 1.

1.13 We will summarise all responses and publish this summary on GOV.UK. The summary will include a list of organisations that responded.

Quality assurance

1.14 This consultation has been carried out in accordance with the UK Government's consultation principles.

1.15 If you have any complaints about the way this consultation has been conducted, please email: beis.bru@beis.gov.uk.

Public Sector Equality Duty

1.16 In reviewing these policies and developing these consultation proposals we have considered the needs of persons with protected characteristics, as defined by the Equality Act 2010: age; disability; gender reassignment; pregnancy and maternity; race (this includes ethnic or national origins, colour or nationality); religion or belief (this includes lack of belief); sex; sexual orientation; marriage and civil partnership.

1.17 At this stage, because of the nature of the policy area and subject of the consultation, we have not identified any opportunities to eliminate unlawful discrimination, harassment, victimisation or any other conduct prohibited by the Equality Act 2010. Nor have we identified any opportunities to advance equality of opportunity or foster good relations between those who share a protected characteristic and those who do not. However, if there is any information you believe we should consider as part of this assessment then please include it with your consultation response.

2

Structure of this consultation

2.1 We are proposing to replace Command Paper 2919 and subsequent updates to it with a revised policy framework. Our vision for the policy framework is to set out, in a single point of reference, the policies of the UK Government and devolved administrations on the management of radioactive substances under normal operating conditions. Policy on managing radioactive incidents and emergencies is out of scope.

2.2 In addition to proposed updates, this revised framework reflects existing policy, practice and regulation for the following policies:

- managing radioactive materials including radioactive sources (radioactive sources are materials that are used to produce radiation for specific purposes, in the civil nuclear and non-nuclear sector);
- managing radioactive liquid and gaseous discharges in the nuclear and non-nuclear sector;
- the import and export of radioactive substances, including waste and spent nuclear fuel;
- managing plutonium.

2.3 While we welcome comments on the entire draft policy framework we are specifically seeking views on proposed changes to some of our policies. The policies which we are proposing to change include:

- managing solid radioactive waste in the nuclear and non-nuclear sector;
- nuclear decommissioning;
- managing spent nuclear fuel and uranium.

2.4 Part I seeks views on the policies we are proposing to change.

2.5 Part II provides a draft of the proposed UK-wide policy framework as it would appear if the policy changes we are consulting on in Part I were implemented. It also includes the policy statements in respect of the policies listed above in paragraph 2.2. We are seeking views in Part II on whether the policy statements in paragraph 2.2 capture accurately and clearly existing policy, practice and regulation.

3

Summary of consultation proposals

Managing solid radioactive waste

3.1 Radioactive waste can come in the form of liquids, gas or solids. Solid radioactive waste is classified in terms of the nature and quantity of radioactivity it contains and its heat-generating capacity. The classifications are:

- low level waste;
- intermediate level waste;
- high level waste.

3.2 In addition to the classifications set out above, the term “higher activity radioactive waste”[3] is used in England, Wales and Northern Ireland to describe radioactive waste which under our current policy is destined for disposal in a geological disposal facility. This includes all high level waste, all intermediate level waste and a small amount of low level waste that is not suitable for disposal in other facilities.

3.3 Current options available for disposal of radioactive waste are:

- landfill sites or disposal on site for the least hazardous radioactive waste;
- the Low Level Waste Repository in Cumbria and the Dounreay Low Level Waste Facility (LLWF) in Scotland for more hazardous low level waste not suitable for disposal at landfill sites.

3.4 Currently under the policy of the UK Government and devolved administrations of Wales and Northern Ireland all intermediate level waste is to be disposed of in a geological disposal facility along with high level waste. A process is underway to identify a suitable site for a geological disposal facility.

3.5 We are proposing some important changes to our policies on managing solid radioactive waste, including disposal. If adopted, these changes would lead to more efficient and proportionate management of this waste and to earlier decommissioning of our nuclear facilities.

3.6 These include proposals to:

[3] Higher activity waste in Scotland includes only intermediate level waste and low level waste not suitable for disposal in current facilities. There is no high level waste in Scotland.

- require those responsible for creating and managing solid radioactive waste to apply a risk-informed approach as a decision-making framework for managing all solid radioactive waste. The proposed new policy requires the properties of the waste (radiological, chemical, physical) and the risk it poses to people and the environment be taken into consideration. The proposed approach would be used together with the radioactive waste classification (low level waste, intermediate level waste and high level waste). Current policies on the management of higher activity radioactive waste in England and Wales are based principally on the waste's radioactivity classification. Our proposals would align with the approach taken by the Scottish Government for the management of higher activity radioactive waste in Scotland. It is also consistent with how solid low level radioactive waste is managed across the UK. Although there is no higher activity radioactive waste in Northern Ireland, the Northern Ireland Executive supports the proposed policy change to a risk-informed approach for management of this type of waste;
- require the application of the waste hierarchy for managing all categories of solid radioactive waste to ensure that the creation of radioactive waste is prevented or minimised. Application of the waste hierarchy is already a requirement in the policy for the management of low level radioactive waste in the UK, and for the management of higher activity radioactive waste in Scotland. We are proposing to extend the requirement to the policies of the UK Government and devolved administrations of Wales and Northern Ireland on the management of higher activity radioactive waste;
- develop a new policy framework for near surface disposal facilities for less hazardous intermediate level waste in England and Wales;
- to allow disposal of intermediate level waste in near surface facilities by amending UK Government and the devolved administrations of Wales and Northern Ireland policies on the disposal of higher activity radioactive waste;
- amend the UK Government's and devolved administrations' policy on managing solid low level radioactive waste to promote on-site disposal on nuclear and former nuclear sites where it is safe to do so.

3.7 If implemented these policy proposals would help drive earlier and more cost-effective nuclear decommissioning and management of radioactive waste without compromising safety and security.

Updating the policy for nuclear decommissioning

3.8 We are seeking views on updating the policy statement on nuclear decommissioning *The Decommissioning of the UK Nuclear Industry's Facilities.*[4] Since its publication in 2004 there have been significant developments in how industry approaches decommissioning. We propose to update the current nuclear decommissioning policy to reflect the developments that have taken place since 2004 and clarify any uncertainties in its application and interpretation. The updated policy would seek to drive earlier, and more cost-effective solutions to decommissioning and clean-up of the nuclear facilities in England, Scotland and Wales, while maintaining high standards of safety, security and protection of the environment.

3.9 We set out in Part I a high-level overview of the proposed content of the updated policy. A full draft of the policy is set out in Part II, chapter 9. The policy does not extend to Northern Ireland as it does not have any nuclear facilities.

Managing nuclear materials and spent nuclear fuel

3.10 We intend to bring together in the policy framework our policies on managing spent nuclear fuel, uranium and plutonium. We are not proposing any changes to our policy on managing plutonium, which is set out in Part II, chapter 11. We are, however, seeking views on:

- an updated policy statement for the management of spent nuclear fuel. Currently policy on the management of spent fuel is contained in several documents, we propose to bring these together in a single coherent policy statement. In particular, we are updating and replacing paragraphs 64 and 65 of the 2008 energy white paper[5] in order to reflect changes in the new and advanced nuclear power sector since 2008.
- a new policy statement on the management of uranium.

Next steps

3.11 The UK Government and devolved administrations will consider and take into account responses to the consultation in formulating the final UK-wide policy framework. We expect to publish the final policy framework in 2024.

[4] UK Government (2004). The Decommissioning of the UK nuclear industry's facilities. Available at: https://www.gov.uk/government/publications/the-decommissioning-of-the-uk-nuclear-industrys-facilities
[5] UK Government (2008). Meeting the Energy Challenge: A white paper on nuclear power. Available at: https://www.gov.uk/government/publications/meeting-the-energy-challenge-a-white-paper-on-nuclear-power

4

Managing solid radioactive waste from the nuclear and non-nuclear sectors

4.1 In this chapter we consider policies on the management of the UK's solid radioactive waste up until the point of disposal. Disposal of solid radioactive waste is discussed in the next chapter. Solid radioactive waste management policy is a devolved matter with respect to civil uses of radioactive substances.

4.2 The UK Government and devolved administrations are seeking views on policy proposals that:

- require those responsible for creating and managing solid radioactive waste to apply a risk-informed approach as a decision-making framework for managing all solid radioactive waste. This means the properties of the waste (radiological, chemical, and physical) and the risk the waste poses to people and the environment should be taken into consideration, rather than the current approach of managing the waste solely by reference to the radioactive waste classification it falls into;
- require the application of the waste hierarchy for the management of all solid radioactive waste.

4.3 If adopted, these policy proposals would support the acceleration of the high hazard and risk reduction programmes at Sellafield, which is a national priority. It would free up space in some highly engineered stores at the sites that are currently being used to store intermediate level waste and would also allow faster progress in decommissioning and clean-up of other nuclear facilities and sites and support decommissioning in the non-nuclear sector (e.g. oil and gas industry). Maintaining high standards of safety, security and environmental protection will be essential.

4.4 A risk-informed approach to managing all categories of solid radioactive waste builds on the approach taken for the management of solid low level waste across the UK. It would be more appropriate and proportionate to the risk posed to people and the environment by some of the intermediate level waste inventory than the current policy approach.

4.5 We are not proposing any changes to the radioactive waste classifications themselves which are well established and widely understood by stakeholders. The classifications (see paragraphs 4.10 - 4.11) are used to inform the UK inventory of current and future arisings of radioactive waste from the nuclear industry, and are used as part of the UK's international reporting obligations to the International Atomic

Energy Agency and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

In the UK, radioactive waste is defined as any substance or article contaminated by or incorporating radioactivity above certain thresholds defined in legislation, and may include substances and articles for which no further use is envisaged.[6] Nuclear materials including spent nuclear fuel, uranium and plutonium are not currently classified as radioactive waste but could become waste at some point in the future if they are deemed by the owners of these materials to have no further use. The proposed policy statements on the management of spent fuel and uranium are set out in Part I chapter 7. The policy statement for the management of plutonium is set out in Part II, chapter 11.

4.6 Solid radioactive waste is produced from operational and decommissioning and clean-up activities in both the nuclear and non-nuclear sectors. Currently, the majority of this waste is generated by the nuclear sites which are the responsibility of the Nuclear Decommissioning Authority (NDA) and EDF Energy. Solid radioactive waste includes a range of materials such as paper, plastics, reactor components, ion exchange resins and filter media, contaminated metals, organic materials, concrete, graphite, and disused radioactive sources from medical and industrial irradiators. It can also include waste such as, sludges, flocculants, oils, solvents, and highly active liquor (HAL) from spent nuclear fuel reprocessing, all of which are converted into solid forms and managed as solid radioactive waste.

Overview of UK radioactive waste classifications

4.7 In the UK radioactive waste is classified in terms of the nature and quantity of radioactivity it contains and its heat-generating capacity (see paragraphs 4.10 to 4.11 and Figure 1). The waste classifications across the full range of radioactive waste are broadly in line with international practice.

4.8 Some waste that contains very low levels of radioactivity poses little radiological risk to health and the environment and is therefore excluded from radioactive waste legislation.[7] Disposal of this waste does not require a permit or other authorisation

[6] UK Government (2007). *Management of Solid Low Level Radioactive Waste in the United Kingdo*m. Available at: https://www.gov.uk/government/collections/managing-waste#solid-low-level-wastes; The Environmental Permitting (England and Wales) Regulations 2016. Available at: https://www.legislation.gov.uk/uksi/2017/1322/contents/made; The Radioactive Substances Act 1993. Available at: https://www.legislation.gov.uk/ukpga/1993/12/contents; The Ionising Radiation Regulations (Northern Ireland) 2017. Available at: https://www.legislation.gov.uk/nisr/2017/229/contents/made and The Environmental Authorisations (Scotland) Regulations 2018. Available at: https://www.legislation.gov.uk/sdsi/2018/9780111039014/contents

[7] For details on the scope of radioactive substances legislation see: UK Government (2018). *Guidance on the scope of and exemptions from the radioactive substances legislation in the UK*. Available at: https://www.gov.uk/government/publications/guidance-on-the-scope-of-and-exemptions-from-the-radioactive-substances-legislation-in-the-uk

from the environment agencies. However, such waste may still be subject to conventional waste regulations and transport regulations and must be managed in accordance with those requirements.

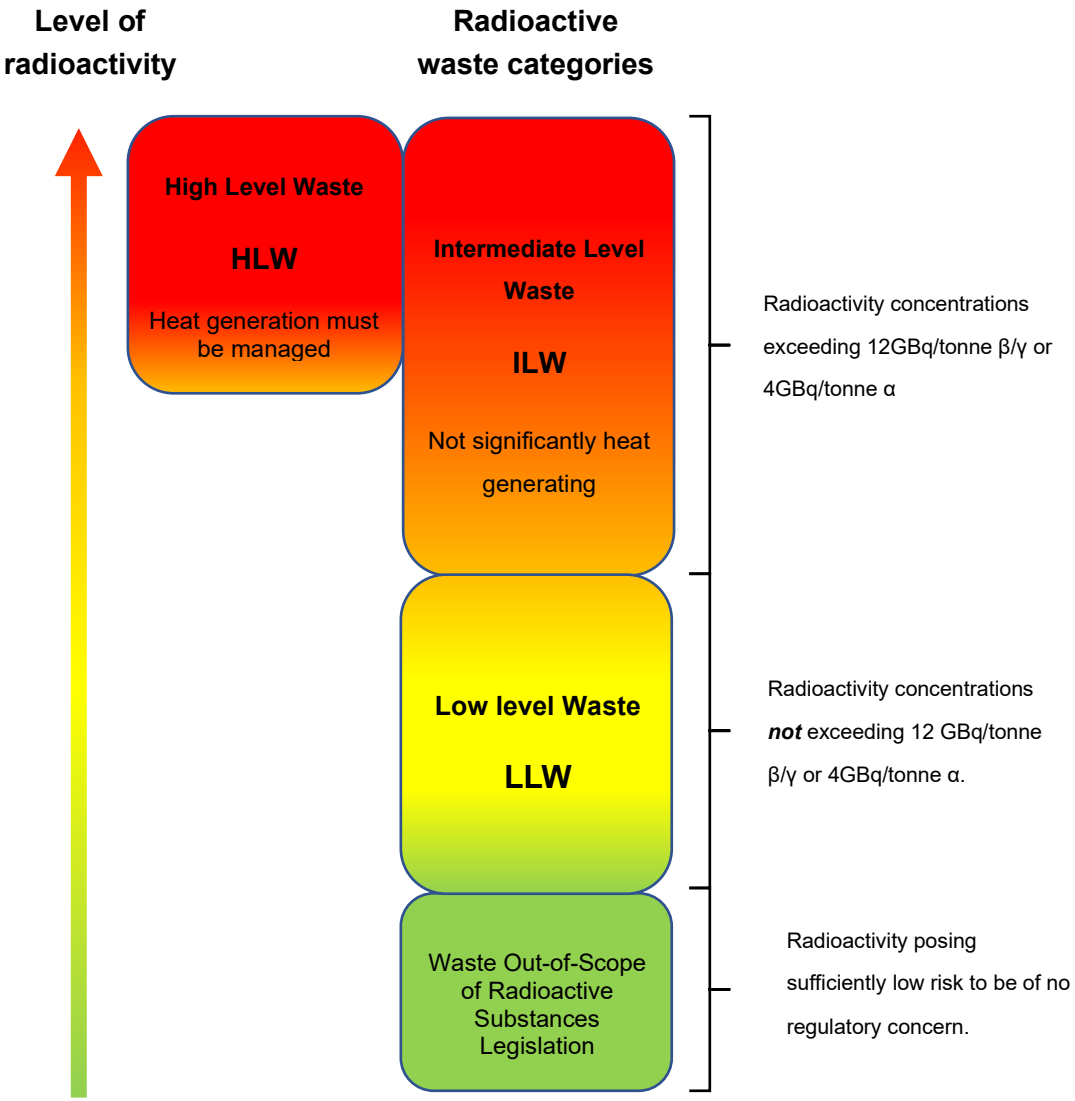

Figure 1. Classification of radioactive waste in terms of radioactivity and heat-generating capacity (ONR/SEPA/DESNZ).

Radioactivity is measured in becquerels (Bq). Becquerels refers to the amount of ionising radiation released when an unstable atom of an element (such as uranium) spontaneously emits energy by radioactive decay. Radioactivity is the term used to describe the rate at which radioactive material emits radiation, or how many atoms in the material decay in a given time period. As such, 1 Bq represents a rate of radioactive decay in which one atom decays per second. The time it takes for half of the atoms in a radioactive substance to decay is known as the half-life. The half-life of a radioactive substance can vary from fractions of a second to billions of years.

4.9 Here we are considering radioactive waste which comes within scope of radioactive waste regulatory controls. These controls are there to protect people and the environment against the risks from ionising radiation. There are three relevant categories of radioactive waste - low level waste (LLW), intermediate level waste (ILW) and high level waste (HLW).

4.10 The categories of radioactive waste are defined as:

- **Low Level Waste (LLW) -** waste having a radioactive content not exceeding 4 Gigabequerels per tonne of total alpha activity or 12 Gigabequerels per tonne of total beta/gamma activity.[8] Within this definition are additional sub-categories for low volume very low-level radioactive waste and high volume very low level radioactive waste.
- **Intermediate Level Waste (ILW) -** waste exceeding the upper boundaries for LLW, but which does not require heat generation to be taken into account in the design of storage or disposal facilities.
- **High Level Waste (HLW) -** waste in which the temperature may rise significantly as a result of its radioactivity, so this factor has to be taken into account in the design of storage or disposal facilities.

4.11 In addition to the classifications set out above, the term higher activity radioactive waste (HAW) is currently used by the UK Government and devolved administrations in policy statements. However, the term is used/defined differently across the different administrations. These differences are as follows:

- the UK Government and devolved administrations of Wales and Northern Ireland (though Northern Ireland does not have any HAW) include within the definition of HAW:

1) HLW from the reprocessing of spent nuclear fuel
2) ILW
3) Some LLW that is not suitable for disposal in current facilities and
4) ILW from the UK's defence programme

- the Scottish Government includes within its definition of HAW:

1) ILW
2) Some LLW that is not suitable for disposal in current facilities

The Scottish Government's definition does not include HLW because there is no HLW in Scotland. Spent nuclear fuel and nuclear materials in Scotland are transferred to and managed at Sellafield.

[8] Radioactive substances produce three main kinds of ionising radiation**:** alpha radiation (α)**,** beta radiation (β) and gamma (γ) rays**.** They are explained in more detail in Part II, chapter 2.

4.12 The UK Government and devolved administrations also use the term borderline (or boundary) waste to describe waste which has a level of radioactivity close to the boundary between two waste categories, typically LLW/ILW.

Current policies on management of solid radioactive waste

Current policy on the management of solid low level radioactive waste

4.13 Currently there is a UK-wide policy on the management of solid LLW, *Policy for the Long Term Management of Solid Low Level Radioactive Waste in the United Kingdo*m, published in March 2007.[9] The policy is implemented through three supporting UK low level waste strategies (nuclear industry,[10] non-nuclear industry,[11] and naturally occurring radioactive materials[12]). The policy requires the use of a risk-informed approach to managing LLW to ensure safety and protection of the environment. It also explicitly requires the reduction of waste arisings (both by radioactivity and by mass) to the minimum through the application of the waste hierarchy (see Figure 2, page 25) to the management of LLW.[13]

Current policy on the management of higher activity radioactive waste

4.14 The UK Government and devolved administrations have taken different approaches to managing higher activity radioactive waste (HAW) (see paragraph 4.11 for definitions of HAW in each of the devolved administrations). Policies for the long-term management of HAW are set out in:

- *Implementing Geological Disposal: Working with Communities* (England), published in 2018;[14]

[9] UK Government (2007). Policy for the long-term management of solid low level radioactive waste in the United Kingdom. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/254393/Low_level_waste_policy.pdf
[10] UK Strategy (2016) for the Management of Solid Low-Level Waste from the Nuclear Industry. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/497114/NI_LLW_Strategy_Final.pdf
[11] UK Strategy (2012) for the management of solid low level radioactive waste from the non-nuclear industry in the United Kingdom: Part 1 Anthropogenic radionuclides. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/48291/4616-strategy-low-level-radioactive-waste.pdf
[12] UK Strategy (2014) for the management of Naturally Occurring Radioactive Material (NORM) waste in the United Kingdom. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/335821/Final_strategy_NORM.pdf
[13] Defra (2011). Guidance on applying the Waste Hierarchy. Available at: https://www.gov.uk/government/publications/guidance-on-applying-the-waste-hierarchy
[14] UK Government (2018). Implementing geological disposal – working with communities: An updated framework for the long-term management of higher activity radioactive waste. Available at: https://www.gov.uk/government/publications/implementing-geological-disposal-working-with-communities-long-term-management-of-higher-activity-radioactive-waste

- *Welsh Government Policy on the Management and Disposal of Higher Activity Radioactive Waste*, published in May 2015;[15]
- *Geological Disposal of Higher Activity Waste: Working with Communities* (Wales), published in 2019;[16]
- *Scotland's Higher Activity Radioactive Waste Policy*, published in January 2011; supported by an Implementation Strategy published in 2016;[17]
- *Implementing Geological Disposal: a Framework for the long-term management of higher activity radioactive waste,* published in 2014[18] (Northern Ireland).

4.15 Management of HAW in the current policies followed by the UK Government and devolved administrations of Wales and Northern Ireland is based on the radioactivity classification of the waste. The policies require that all HAW should be disposed of in a geological disposal facility, regardless of whether the risk the waste poses to people and the environment requires the level of isolation and containment provided by geological disposal.

4.16 The Scottish Government's HAW policy is underpinned by the principle of a risk-informed approach based on the radiological and any other hazards of the treatment or storage or disposal of the waste.

4.17 The policies of the UK Government and the devolved administrations of Wales and Northern Ireland do not currently explicitly require the application of the waste hierarchy, although in practice its principles are generally observed.

4.18 The Scottish Government's HAW Policy explicitly requires the waste hierarchy to be applied, where practicable, in the management of HAW in Scotland.

Optimising solid radioactive waste management

4.19 In the UK there is an increasing focus and emphasis on sustainable approaches and solutions to radioactive waste management, including operational waste and waste arising from nuclear and non-nuclear decommissioning and clean-up activities.

[15] Welsh Government (2015). Welsh Government policy on the management and disposal of higher activity radioactive waste. Available at: https://gov.wales/sites/default/files/publications/2019-06/policy-on-the-management-and-disposal-of-higher-activity-radioactive-waste.pdf
[16] Welsh Government (2019). Geological disposal of Higher Activity Radioactive Waste: Working with Communities. Available at: https://gov.wales/sites/default/files/publications/2019-04/geological-disposal-of-higher-activity-radioactive-waste-guidance-for-communities.pdf
[17] Scottish Government (2011). Scotland's Higher Activity Radioactive Waste Policy. Available at: https://www.gov.scot/Topics/Environment/waste-and-pollution/Waste-1/16293/higheractivitywastepolicy/hawpolicy2011
[18] Implementing Geological Disposal: a Framework for the long-term management of higher activity radioactive waste. Available at https://www.gov.uk/government/publications/implementing-geological-disposal

4.20 The radioactive waste management landscape in the UK is also changing as the decommissioning and clean-up of the nuclear estate (see Part I, chapter 6), and to some extent the non-nuclear sectors, progresses. The ongoing decommissioning and clean-up of nuclear sites will result in higher volumes of less hazardous radioactive waste (ILW containing shorter-lived isotopes and large volumes of LLW), rather than the more hazardous ILW and HLW that is created primarily during the operation of nuclear facilities.

4.21 The 2007 UK solid LLW policy (and its three supporting strategies) facilitated better management of the significant volumes of solid LLW arising from the large-scale decommissioning and environmental remediation work across the nuclear estate as well as other sources of solid LLW. It also introduced a risk-informed approach to determine the most appropriate disposal options for LLW which enabled waste owners and producers to develop optimal solutions on a case-by-case basis (see Part I, chapter 5 for more detail on disposal infrastructure).

4.22 The Low Level Waste Repository Ltd (LLWR Ltd), now part of Nuclear Waste Services[19] has led the implementation of the policy and delivery of the nuclear industry solid LLW strategy on behalf of the NDA and UK Government and devolved administrations through the National LLW Programme. The LLWR Ltd has also provided a series of commercial frameworks allowing waste producers to access a range of treatment and alternative disposal routes provided by commercial operators. The National LLW Programme has driven a change in thinking, behaviours and culture in waste owners and producers to deliver significant improvements in LLW management. This has resulted in up to 98% of LLW being diverted from disposal at the LLWR, to treatment and alternative disposal routes.

4.23 The 2016 *UK Strategy for the Management of Solid Low Level Waste from the Nuclear Industry*[20] requires waste producers to seek to identify and implement opportunities for managing wastes close to the LLW/ILW boundary in ways that optimise value and benefit. As a result, industry has made progress in optimising the management of borderline ILW/LLW. This has been achieved through a range of approaches including decay storage, additional characterisation, sort/segregation, treatment and conditioning. This has led to some waste that was previously classified as ILW to be reclassified as LLW suitable for disposal to the LLWR, enabling earlier disposal of this waste (see case study 1).

[19] On 31 Jan 2022, Nuclear Waste Services was launched bringing together into one organisation Low Level Waste Repository Limited, Radioactive Waste Management Limited and the NDA's Integrated Waste Management Programme. Nuclear Waste Services is the joint trading / operating name of LLW Repository Limited (LLWR) and Radioactive Waste Management Limited (RWM).
[20] UK Strategy (2016) for the Management of Solid Low-Level Waste from the Nuclear Industry. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/497114/NI_LLW_Strategy_Final.pdf

Case Study 1: Reclassification opportunities for ILW, enabling early management solutions

In line with the 2016 UK Strategy for the Management of Solid Low Level Waste from the Nuclear Industry, LLWR Ltd has been working with Magnox and Sellafield to explore and implement opportunities identified by the sites to manage some of their ILW differently.

Since the publication of the UK Strategy, there has been a significant change in the way LLW is managed, with up to 98% diverted from disposal to the LLWR to treatment and alternative disposal routes. This change in practice has led to waste producers starting to think differently about how some of their inventory of waste currently identified in the UK Radioactive Waste Inventory[21] as ILW could be managed.

Left to right, Fuel element debris, steel drums of encapsulated waste, drums of plutonium contaminated waste, boxes of waste from Windscale AGR.

Through a range of approaches, including decay storage, additional characterisation, sort/segregation, treatment and conditioning, a proportion of ILW waste has been reclassified as LLW suitable for disposal to the LLWR:

- A portion of Fuel Element Debris (FED) at the Magnox Bradwell site was identified as LLW and met the acceptance criteria for the LLWR after conditioning. This enabled the Bradwell site to enter Care and Maintenance earlier than would have otherwise been possible and has led to Magnox exploring opportunities for FED stored at some of their other sites to be managed in the same way.
- Over one thousand stainless steel drums of encapsulated waste have undergone decay storage at the Magnox Winfrith site, allowing them to be sent for disposal to LLWR over the next few years.
- Thousands of drums of plutonium contaminated materials are currently stored at Sellafield. Historically all waste from facilities containing plutonium contaminated materials was managed as ILW. New assay equipment installed in the store has enabled some of the waste to be better characterised and disposed as LLW. These drums are super-compacted to maximise volume reduction before sending to the LLWR for disposal.

[21] NDA (2019). UK Radioactive Waste Inventory. Available at: https://ukinventory.nda.gov.uk/

- Concrete boxes of waste from the historic Windscale Advanced Gas Reactor were packaged as ILW during the decommissioning of the facility some years ago. More recently Sellafield identified that some of these packages were likely to be LLW through decay storage and better characterisation. A project is underway to identify and collate the information needed to demonstrate their acceptance for disposal to the LLWR as LLW.

These projects deliver significant benefits, including early safe and compliant disposal of the waste; reduction in risk; and freeing up space in highly engineered ILW stores to support the NDA's decommissioning mission resulting in over £100 million cost savings.

Why adopt a policy for a risk-informed decision-making framework to managing solid radioactive waste?

4.24 All radioactive waste contains a broad range of radiological, chemical, and physical properties. The appropriate and proportionate management of radioactive waste does not depend only on the waste's radioactive properties (level and type of radioactivity), but also on its chemical and physical properties (e.g. toxicity or volatility).

4.25 For example, certain LLW may contain radionuclides with high levels of toxicity or other toxic heavy metals or organic compounds that are harmful to human life or the environment. In addition, the physical properties of the waste, ranging from large solid objects to flocs and sludges, can pose additional hazards. Due to this, some LLW can be more hazardous than certain ILW that does not have these additional hazards.

4.26 While the Scottish Government's 2011 HAW policy aims to enable a risk-informed approach to managing HAW in Scotland, current policies of the UK Government and devolved administrations of Wales and Northern Ireland do not encourage the application of a risk-informed approach to the management of HAW. This means that current policies in England, Wales and Northern Ireland result in a potentially sub-optimal approach to managing some of the ILW inventory. Currently all ILW is required to be managed in the same way as HLW, regardless of whether the risk posed to people and the environment warrants such a high level of protection and resultant cost.

4.27 The UK Government and devolved administrations of Wales and Northern Ireland are proposing that the management of all solid radioactive waste should be based on a risk-informed decision-making approach, taking account of the properties of the waste including the radioactive waste classification. The proposed approach is similar to the approach taken by the Scottish Government for the management of ILW in Scotland.

4.28 Adopting an approach to managing solid radioactive waste that is more proportionate to the risk posed by the waste to people and the environment is consistent with the graded approach to regulating the management of radioactive substances. The graded approach is discussed in Part II, chapter 5.

4.29 Adopting a policy framework that facilitates a more comprehensive risk-informed decision-making approach to be taken to HAW in England and Wales should encourage the use of more appropriate, proportionate, and cost-effective management options (see also Part I, chapter 5). If adopted, the new policy framework would support, among other things, the acceleration of the high hazard and risk reduction programmes at Sellafield, which is a national priority. This approach would allow a more cost-effective use of the limited capacity in some highly engineered stores at the sites that are currently being used to store ILW that is close to the ILW/LLW boundary. It would also allow faster progress in decommissioning and clean-up of other nuclear facilities and sites and support decommissioning in the non-nuclear sector (e.g. oil and gas industry) whilst maintaining high standards of safety, security and environmental protection.

4.30 Further benefits of a more comprehensive risk-informed approach to managing all solid radioactive waste include:

- increasing the diversity of technologies, options and infrastructure for radioactive waste management, leading to efficiencies in all stages of the lifecycle;
- facilitating greater consistency across the whole of the UK by simplifying, where appropriate, the procedures and processes for operators or owners of sites within the different nations of the UK, thereby ensuring value for money by using resources where they have most effect through managing all radioactive waste in ways that are appropriate and proportionate to the risk and hazard they present based on the properties of the waste.

4.31 Following consultation, any implementation of a risk-informed approach for managing all solid radioactive waste, would need consideration to be given to how the policy is implemented and delivered. This could be through an integrated solid radioactive waste management strategy, which could replace the current three LLW strategies. Delivery of the strategy could be through an integrated solid radioactive waste programme, which would build on and replace the National LLW Programme and the NDA's Integrated Waste Management Programme. The UK Government and devolved administrations will work together with regulators, the NDA, radioactive waste management organisations and other waste producers and owners on the approach to implementation and delivery.

4.32 The implementation of specific strategies or programmes taken to deliver this proposed policy, depending on the scope of the strategy or programme, would be

subject to public consultations and joint ministerial sign off by the UK Government and devolved administrations.

1. **Do you agree with the proposal to require the application of a risk-informed approach as a decision-making framework for the management of all solid radioactive waste? Please provide the reasoning behind your response**.

Extending the application of the waste hierarchy

4.33 The waste hierarchy (see Figure 2) describes the principle of adopting options for managing waste that start with those that have least impact on the environment. It starts with waste prevention, requiring waste producers and owners to consider how they might design and implement their work so as not to create waste in the first place. If waste prevention is not practical or possible, then waste volumes should be minimised. Consideration about the re-use of items is next, followed by recycling where practicable, and then finally disposal.

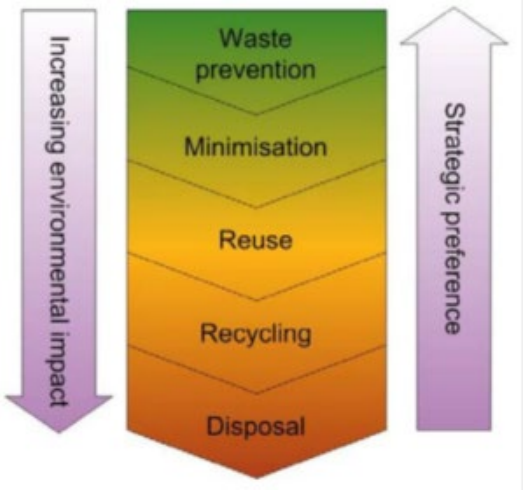

Figure 2. The Waste Hierarchy

4.34 Application of the waste hierarchy is already required for the management of solid LLW. It is also an explicit requirement of the Scottish Government's policy on the management of HAW in Scotland. However, current policy on the management of HAW pursued by the UK Government and devolved administrations in Wales and Northern Ireland does not specify application of the waste hierarchy. Case Study 2 demonstrates the benefits of applying the waste hierarchy to the management of LLW.

Case Study 2: Application of the waste hierarchy to the management of LLW

Thermal Treatment

The 2010 LLW Strategy recognised there was a significant opportunity to utilise existing supply chain thermal treatment routes for combustible LLW, and supported LLWR Ltd to explore the opportunity to develop a commercial framework to allow waste producers to access this route. Since the route was opened in 2010, over 28,000m³ of LLW has been sent for treatment by incineration, mainly soft waste (such as PPE, paper and plastic), but also oils which had no previous treatment route. The incineration process results in a 99% reduction in waste volume, with the resulting ash being sent to permitted landfill for disposal.

soft bagged waste (left), drummed waste (middle), wheelie bins in transport containers (right).

Metal Recycling

Since 2010 over 32,000 tonnes of metallic LLW has been diverted from disposal for treatment, allowing the metal to be recycled. One significant project was a total of 820 tonnes of metallic primary circuit components from the Magnox Ltd Chapelcross site, which had been removed from the plant and stored in lay-down areas on the site as part of the reactor decommissioning programme. This was a complex project to send the components for treatment and metal recycling in a short time frame, delivered by a multidisciplinary team from Magnox, LLWR Ltd and Cyclife. The project's complexity was caused by a range of issues including the presence of asbestos, the requirement to remove the stored energy from spring hangers, heavy lifting and major road restrictions because of the size of some of the components. The components were successfully sent for treatment at the Cyclife facility in Sweden, with over 90% of the metal able to go for recycling.

an elbow component (left), specialist transport vehicle (middle), components being reduced in size before smelting (right).

4.35 The UK Government and devolved administrations consider that the waste hierarchy should be used as a framework for waste management decision-making for all categories of solid radioactive waste across the UK. Effective application of the waste hierarchy should lead to the avoidance or minimisation of the production of radioactive waste including, secondary radioactive waste produced during treatment of existing radioactive waste or through decommissioning and clean-up activities.

4.36 Application of the waste hierarchy to all solid radioactive waste should enable an effective balance of priorities including value for money, affordability, technical maturity, and the protection of health, safety and the environment. However, we recognise that hazard and risk reduction and nuclear safety priorities may limit its application in certain circumstances. For example, some waste is not amenable to being managed at higher levels in the waste hierarchy and disposal may be the only option. Where waste does require disposal, we consider that this should be achieved in the optimal way, by applying the Best Available Techniques and Best Practicable Means (BAT/BPM), in order to minimise the impact of those disposal activities. We propose to make it explicit in the policy of the UK Government and devolved administrations of Wales and Northern Ireland that the waste hierarchy should be applied, where practicable, to the management of HAW, aligning policy for managing HAW with that already followed in Scotland.

2. **Do you agree that application of the waste hierarchy should be an explicit policy requirement for the management of all solid radioactive waste where practicable? Please provide the reasoning behind your response**.

5

Disposal of solid radioactive waste

5.1 Disposal is the final stage in the waste management lifecycle and is the emplacement of waste into an appropriate facility with no intention to retrieve it.

5.2 We are seeking views on proposals:

- to amend the current policies of the UK Government and the devolved administrations of Wales and Northern Ireland on the disposal of HAW to allow disposal of ILW in near surface facilities;
- for a new policy framework to facilitate the development by the NDA of near surface disposal facilities for less hazardous ILW in England and Wales;
- promoting the use of on-site disposal of radioactively contaminated waste from the decommissioning of nuclear sites, subject to environmental permits.

Current and planned disposal facilities for solid radioactive waste

5.3 Radioactive waste can range from waste that can be safely disposed to conventional landfill sites, to items that need to be isolated and contained underground in a highly engineered facility. The disposal options open to radioactive waste producers in the UK currently include:

- landfill sites for the least hazardous LLW;
- specialised repositories for LLW, such as the LLWR in Cumbria and the Low Level Waste Facility (LLWF) in Caithness, for waste that is not suitable for disposal at landfill sites;
- disposal on site.

5.4 In future more disposal capacity will be needed. The UK and Welsh Governments have already set out processes for identifying a suitable location with a willing community for a geological disposal facility (GDF) for the UK's most hazardous radioactive waste. The Scottish Government has also set out its strategy to develop near surface disposal facilities for some ILW.

Geological disposal

5.5 Geological disposal involves isolating radioactive waste deep inside a suitable rock formation to ensure that no harmful quantities of radioactivity ever reach the surface environment. This is achieved through the use of multiple barriers that work together to provide protection over hundreds of thousands of years. It is not a case of simply depositing waste underground. Figure 3 gives an illustration of a possible GDF.

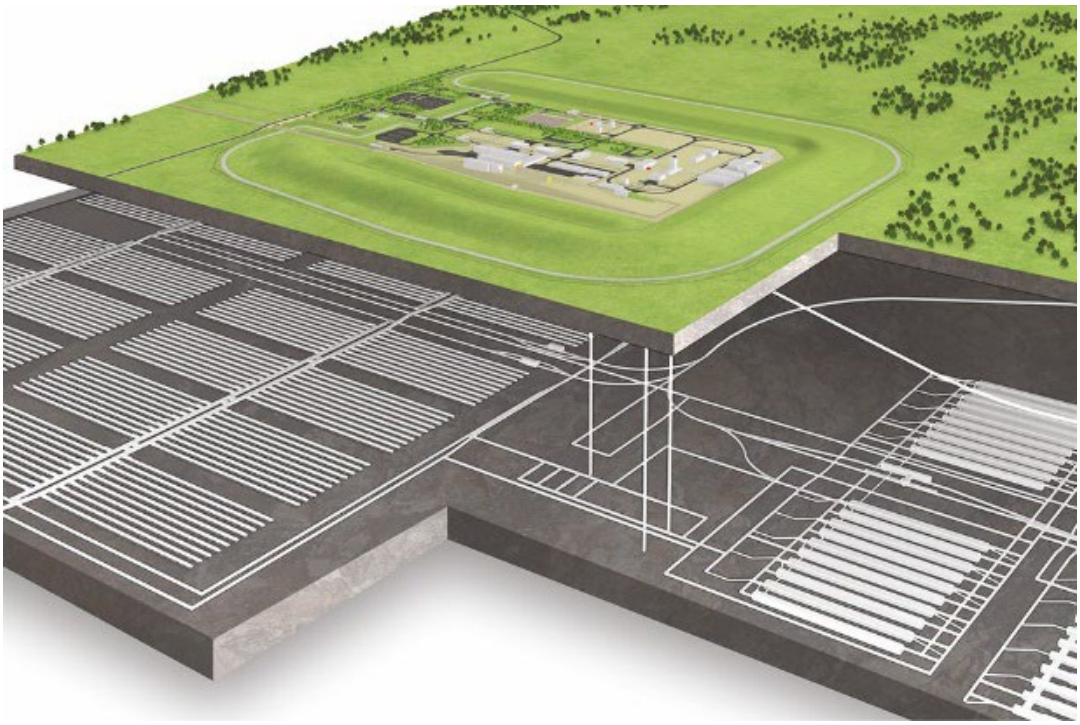

Figure 3. Artist's impression of a possible GDF lay out (Source: RWM)

5.6 International consensus is that by constructing a disposal facility within an appropriate geological setting deep underground the geological formations around the engineered facility will work together with the engineered barriers to isolate and contain the radioactivity for a very long period (see Figure 4). Other countries that are progressing geological disposal include Canada, Finland, France, Sweden, Switzerland and the USA.

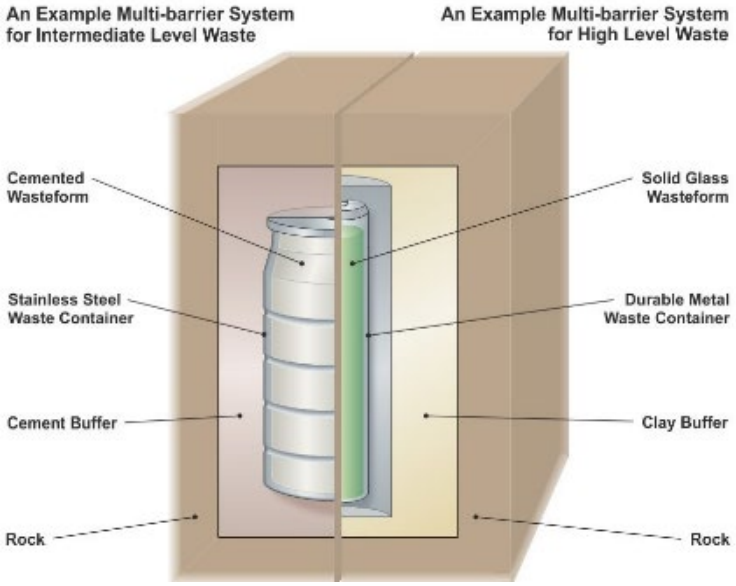

Figure 4. Multi-barrier system (Source: NDA)

5.7 It remains the policy of the UK Government and the devolved administrations of Wales and Northern Ireland to manage the most hazardous radioactive waste through geological disposal. In December 2018 the UK Government published its most recent policy framework for implementing geological disposal (*Implementing Geological Disposal: Working with Communities*)[22] and launched a new process for identifying a suitable location for a GDF in England. The Welsh Government launched a similar process for identifying a suitable location for a GDF in January 2019.[23] Northern Ireland is not participating in the siting process and there are no plans to site a GDF in Northern Ireland. The Scottish Government has pursued a policy of near surface, near site management for HAW located in Scotland since 2011 and is not participating in the geological disposal programme.

5.8 Radioactive Waste Management Ltd (RWM) now part of Nuclear Waste Services,[24] has been given the responsibility by the NDA for implementing geological disposal of HAW. The process for identifying a suitable location for a GDF in England is set out in chapter 6 of *Implementing Geological Disposal: Working with Communities*. A similar process is set out for Wales in *Geological Disposal of Higher Activity Radioactive Waste: Working with Communities*. Both are community consent-based

[22] UK Government (2018). Implementing geological disposal – working with communities: An updated framework for the long-term management of higher activity radioactive waste. Available at: https://www.gov.uk/government/publications/implementing-geological-disposal-working-with-communities-long-term-management-of-higher-activity-radioactive-waste

[23] Welsh Government (2019). Geological disposal of Higher Activity Radioactive Waste: Working with Communities. Available at: https://gov.wales/sites/default/files/publications/2019-04/geological-disposal-of-higher-activity-radioactive-waste-guidance-for-communities.pdf

[24] On 31 Jan 2022, Nuclear Waste Services was launched bringing together into one organisation Low Level Waste Repository Limited, Radioactive Waste Management Limited and the NDA's Integrated Waste Management Programme. Nuclear Waste Services is the joint operating name of LLW Repository Limited (LLWR) and Radioactive Waste Management Limited (RWM).

processes and require RWM to work in partnership with local authorities and other community representatives. They set out how:

- investment is provided to communities that participate in the process;
- communities can withdraw from the process;
- a positive Test of Public Support must be undertaken by the Potential Host Community before the construction and operation of a GDF can take place.

5.9 We are not proposing any changes to these processes which are already underway.

Proposed changes to the inventory for geological disposal

5.10 We propose to amend our current policies on implementing geological disposal to make clear that not all ILW needs to be disposed of in a GDF. Where it is safe to do so less hazardous ILW can be disposed of in near surface facilities.

5.11 This proposed change would bring policy on the management and disposal of ILW into closer alignment across the UK, as near surface disposal of some ILW is already an option in Scottish Government policy. The Scottish Government and the NDA will continue to work together to develop a near surface disposal concept suitable for the management of Scotland's HAW.

5.12 We also want to set out the most up to date information we have about the waste that may arise from new nuclear projects that will have to be disposed of in a GDF. The UK and Welsh Governments' current policies state the inventory for disposal will include a defined amount of waste from a nuclear new build programme, comprising spent fuel (yet to be declared waste) and ILW arising from new nuclear development up to the 16 gigawatts electrical output from the new nuclear pipeline comprising large scale nuclear technologies, which was set out in the 2014 white paper, *Implementing Geological Disposal.*[25]

5.13 The figure of 16 gigawatts electrical output was based on the industry ambition at the time. It no longer reflects the current situation. In April 2022 the UK Government set out an ambition in its British Energy Security Strategy[26], to increase its plans for deployment of nuclear power to up to 24 gigawatts.

5.14 Specifically, the UK Government is committed to bringing at least one further large-scale nuclear project (in addition to Hinkley Point C) to the point of Final Investment Decision by the end of this UK Parliament and two projects to the point of Final

[25] Implementing Geological Disposal (DECC) (2014). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/332890/GDF_White_Paper_FINAL.pdf

[26] British Energy Security Strategy. Available at: https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy

Investment Decision in the next Parliament, subject to clear value for money and relevant approvals.

5.15 The UK Government is also providing up to £385 million to support the next generation of nuclear technology aiming to deploy a domestic small modular reactor (SMR) design and an advance modular reactor (AMR) demonstrator by the early 2030s. It is not possible at this stage to estimate the number or size of advanced nuclear projects.

5.16 The waste from a new build programme of large-scale nuclear power stations and SMRs, comprising spent fuel (yet to be declared waste) and ILW not suitable for disposal in near surface facilities will be disposed of in a GDF. Waste from any future AMRs (including spent fuel yet to be declared waste) will also be disposed of in a GDF if it is suitable to do so. It would need to undergo an Assessment of Disposability by RWM in support of the regulatory and permitting processes of the ONR and relevant environmental regulators before the final decision can be taken on whether it will be disposed of in a GDF.

5.17 We recognise that communities considering hosting a GDF will want to have as clear as possible an understanding of the inventory for disposal before they take a Test of Public Support. This information will also be needed by RWM for its application for development consent. Changes in the UK Radioactive Waste Inventory (UKRWI), and hence the Inventory for Geological Disposal (see below), will occur as UK nuclear sites evolve and the decommissioning programme matures. For planning purposes, however, RWM will factor the waste from the new nuclear ambition of up to 24 gigawatts into their planning for a GDF as the siting process progresses.

5.18 The estimated quantity and the types of waste to be consigned to a GDF needs to be visible. Regular published updates to the inventory will ensure transparency. UKRWI updates are currently published every 3 years. To support the implementation of geological disposal, RWM also publishes a quantified description of the Inventory for Geological Disposal every 3 years. In future this will continue to include updated estimates of waste arising from new nuclear build, based on the realistic pipeline of development at the time. The most recent report was published in 2021, together with the methodologies and assumptions that were used in its development.[27] The UK and Welsh Governments are committed to providing as much clarity as possible as the position evolves.

Why near surface disposal for ILW?

5.19 Under the current policy of the UK Government and the devolved administrations of Wales and Northern Ireland all ILW must be disposed of in a GDF. As set out in

[27] Radioactive Waste Management Ltd (RWM) (2021). 2019 Inventory for Geological Disposal. Available at: https://www.gov.uk/government/publications/2019-inventory-for-geological-disposal

chapter 4, ILW can range from radioactive waste that is very similar in nature and properties to LLW to very hazardous radioactive waste, which needs the greater degree of isolation and containment that a GDF provides. The Committee on Radioactive Waste Management (CoRWM) have noted that some of the radioactive waste from the decommissioning of the UK's nuclear facilities is likely to be short-lived ILW and commented that consideration should be given to its disposal with LLW in near surface facilities.[28]

5.20 Since 2006 it has been the policy of the UK Government and devolved administrations of Wales and Northern Ireland to consider other disposal options (as well as a GDF) that could potentially improve the overall long-term management of HAW. The UK Government most recently reiterated this in its policy for implementing geological disposal in December 2018, when it specifically referred to work the NDA is carrying out to examine alternative options for managing waste at the ILW and LLW boundary.

5.21 Work undertaken by the NDA, has demonstrated that a proportion of the ILW that will be generated during decommissioning does not require the level of isolation and containment provided by a GDF and may be safely disposed of in a near surface facility.[29] Annex 2 summarises the work the NDA carried out to identify ILW that is potentially suitable for near surface disposal. Some ILW from non-nuclear industries may also be suitable for disposal in a near surface facility.

5.22 HLW and ILW and LLW not suitable for other disposal routes, will still require the isolation and containment offered by a GDF in England or Wales.

5.23 Near surface disposal facilities could provide an earlier and more cost-effective solution than a GDF for a proportion of the less hazardous waste in the ILW category. Near surface disposal is not a new concept. We already have near surface disposal facilities operating in Cumbria and Dounreay for the disposal of LLW. Near surface disposal of less hazardous ILW could offer a more sustainable solution by potentially speeding up decommissioning of some sites and freeing up the land earlier for other uses. Near surface disposal has the potential to reduce the burden on future generations of managing some of the waste by reducing the need for prolonged storage, storage facility construction and maintenance, and possible waste re-packaging.

5.24 Near surface disposal of short-lived and low activity ILW is already operating safely in Finland, France, Spain and Sweden.

[28] Managing our radioactive waste safely: CoRWM's recommendations to Government (2006). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/294118/700_-_CoRWM_July_2006_Recommendations_to_Government_pdf.pdf

[29] Nuclear Decommissioning Authority (NDA) (2020). Near surface disposal strategic position paper. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/910184/NSD_StrategicPositionPaper_August_2020_FINAL_V2.pdf

5.25 The NDA has estimated that by 2040 up to 21,000m³ of less hazardous ILW could be disposed of in a near surface facility with net savings of £0.3billion to £0.45 billion. The NDA has estimated it could take around 10 years to identify a site and develop a new facility. Annex 3 gives more detail on these initial estimates of costs and benefits.

Design of a near surface disposal facility for ILW

5.26 A near surface disposal facility for ILW could be located at the surface or tens of metres below the ground. Its design would be dependent upon the location of the site and the level of hazard posed by the radioactive waste intended for disposal. Figure 5 shows an illustration of an at surface near surface disposal facility concept.

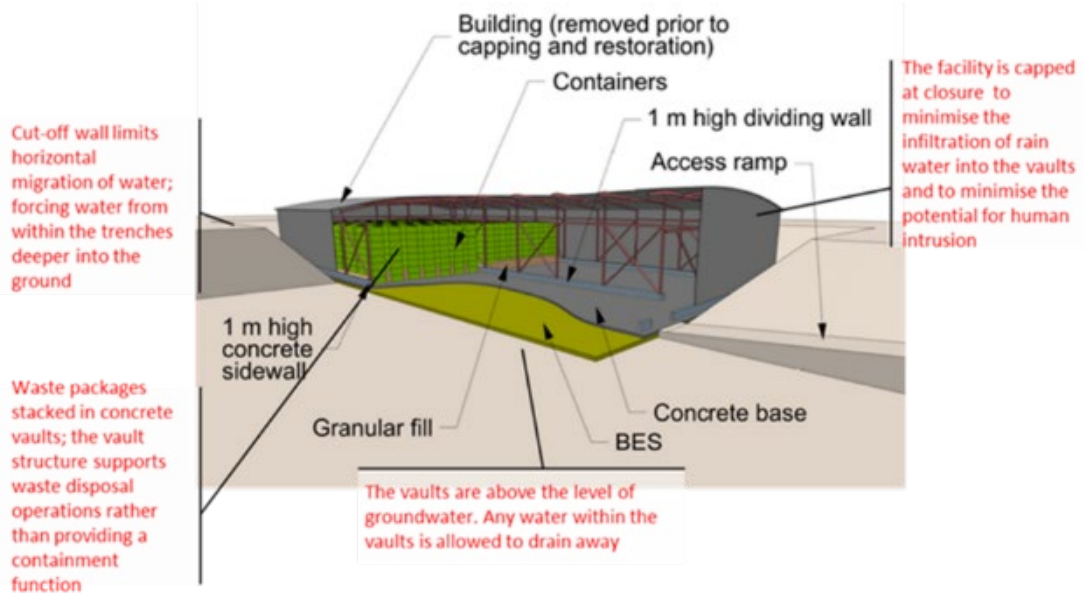

Figure 5. Artist's impression of the at surface concept for a near surface disposal facility for ILW (Source: NDA). BES = bentonite enhanced sand.

Proposed siting policy framework for near surface disposal for intermediate level waste in England and Wales

5.27 A GDF will be a multi-billion pound engineering and infrastructure project. It is one of the biggest environmental protection projects of our lifetime. The process to identify and select a site for a GDF requires detailed technical work that could take around 15 to 20 years. The UK and Welsh Governments' approach therefore is to find a community that is willing to host a GDF.

5.28 We are proposing a different approach to developing a near surface disposal facility because it would be a significantly smaller project. The investigations necessary to identify a suitable location would be far less complex and time consuming, without the need to characterise geological features at great depth over a large area. The construction of a near surface disposal facility, particularly the at surface concept is

much less complex with fewer barriers necessary to contain the type of waste that could be disposed of there. An at surface near surface disposal facility would be similar to the engineered vaults currently in operation at the LLWR in Cumbria and the Low Level Waste Facility in Caithness.

5.29 The NDA has estimated it could identify a suitable site, obtain authorisation from the relevant regulators and planning permission, and construct a near surface facility in around 10 years. A near surface disposal facility below the surface would likely take longer to develop than an at surface disposal facility but would still be a considerably smaller and less complex project than a GDF.

5.30 We expect the NDA to develop at least one near surface disposal facility on land within its estate in either England or Wales, subject to a robust business case and authorisation from the relevant regulators. Our proposed siting policy would require a transparent approach for the evaluation of potential sites, in line with the NDA's existing transparency and openness policy.

5.31 We propose that the NDA should make any near surface facilities it develops available to other nuclear and non-nuclear industry managers of radioactive waste, on the basis of suitable commercial terms. The NDA should also provide a community benefits package to the people that live in the local area of its chosen site or sites, as it currently does for the community near the LLWR, in recognition of the service that the community is providing for the rest of the UK. It will be for the NDA to determine the monetary value of the package and to work with the community to decide how it is to be administered and distributed in line with its existing socio-economic policies for supporting communities around NDA sites.

Proposed land use planning approach for near surface disposal for intermediate level waste in England and Wales

5.32 Any near surface disposal facility for ILW will be subject to the usual local planning requirements under the Town and Country Planning Act 1990. Before selecting a site, the NDA would engage with representatives from local communities in areas that may be suitable. We do not propose to make it a nationally significant infrastructure project.

How will a near surface disposal facility for ILW in England and Wales be regulated?

5.33 A near surface disposal facility for ILW would be subject to robust regulatory requirements to ensure that people and the environment are protected. A near surface disposal facility for less hazardous ILW would be no less safe than disposing of this waste in a GDF. There will be no compromise in health, safety and environmental protection standards. Developers and operators of near surface disposal facilities must adhere to strict radiological protection criteria. These are set out in Part II, Appendix 4.

5.34 A near surface disposal facility for ILW would need to be authorised by the relevant environment agency – the Environment Agency in England and Natural Resources Wales in Wales. To obtain authorisation, the NDA will need to show that its approach to developing a facility - including its design, construction, operation and closure - will meet a series of principles and requirements. These will need to be set out in an environmental safety case. The environmental safety case will also specify detailed waste acceptance criteria for the disposal facility, that define and constrain the types, characteristics and quantities of waste that can be disposed of there. The environment agencies have published guidance for the developers or operators of near-surface facilities[30] and a GDF,[31] which are reviewed and updated periodically. The guidance documents explain the requirements a developer is expected to fulfil when they apply for an authorisation to develop a disposal facility in order to demonstrate that their facility will protect people and the environment.

5.35 Near surface facilities may also require a nuclear site licence from ONR to operate as well as a permit from the relevant environment agency. Although radioactive waste that is suitable for disposal in near surface facilities requires less isolation and containment, it may still present sufficient hazard during handling operations to warrant regulation under a licence. However, this will only become clear when the inventory for disposal at a particular site is known. More information on the regulatory requirements for radioactive waste disposal facilities can be found in Part II, chapter 8.

3. **Do you agree with the proposed amendment to current policies on geological disposal to allow disposal of ILW in near surface facilities? Please provide the reasoning behind your response.**

4. **Do you agree with the proposed policy framework for the development of near surface disposal facilities by the NDA for the disposal of less hazardous ILW? Please provide the reasoning behind your response.**

On site disposal

5.36 During the final stages of decommissioning and clean-up of nuclear facilities, amounts of rubble are generated. A small percentage of this material may be contaminated with radioactivity and would therefore be classified as LLW or high

[30] EA, SEPA & NIEA (2009) Near-Surface Disposal Facilities on Land for Solid Radioactive Wastes: Guidance on Requirements for Authorisation. Available at: https://www.gov.uk/government/publications/near-surface-disposal-facilities-on-land-for-solid-radioactive-wastes

[31] EA & NIEA (2009) Geological Disposal Facilities on Land for Solid Radioactive Wastes: Guidance on Requirements for Authorisation. Available at: https://www.gov.uk/government/publications/geological-disposal-facilities-on-land-for-solid-radioactive-wastes

volume VLLW.[32] In addition, there may be contaminated substructures, pipelines and soils on the sites.

5.37 Excavating this waste, packaging it and transporting it for disposal in approved facilities offsite can result in negative impacts, such as increasing the risks to workers' health and safety during excavation, increased HGV traffic and associated noise, dust, pollution and carbon dioxide emissions. In some cases, it may be safer and more sustainable to manage contaminated waste on site, rather than to excavate it and transport it for disposal elsewhere. There are three ways in which this can be done:

a) building engineered facilities on site (for waste that requires this level of protection);

b) minimising the generation of radioactive waste by managing radioactive contamination of soils, sub surface structures or pipelines in-situ (known as in-situ disposal). This relies on natural attenuation and generally requires monitoring;

c) using lightly contaminated rubble to fill voids, to construct roads or tracks, to construct screens or for necessary landscaping on site (known as "disposal for a purpose"). This is a form of re-use.

5.38 Existing environmental legislation (the Environmental Permitting (England and Wales) Regulations 2016 and the Environmental Authorisations (Scotland) Regulations 2018) allows site operators to apply for a permit for any of these waste management options. Since existing procedures for option a) are well established, the remainder of this discussion is focussed on options b) and c) above, which we refer to as "on-site disposal".

5.39 The English, Scottish and Welsh environment agencies have jointly set out their requirements regarding decommissioning and clean-up of nuclear sites and these requirements include options for on-site disposal.[33]

5.40 In addition to an environmental permit, on-site disposal may also require planning permission.

5.41 On-site disposal has the potential to further reduce the risks associated with excavation as well as reducing environmental impacts such as HGV traffic, dust, noise, pollution and carbon dioxide emissions. The UK Government and devolved administrations therefore support the on-site disposal of suitable LLW and VLLW on nuclear and former nuclear sites, where it is safe and where overall social, environmental and economic impacts are lower than those of other disposal options.

[32] Very Low Level Waste (VLLW) is a sub-category of LLW with specific radioactivity limits.
[33] Management of radioactive waste from decommissioning of nuclear sites: Guidance on Requirements for Release from Radioactive Substances Regulation. Available at: https://www.sepa.org.uk/media/365893/2018-07-17-grr-publication-v1-0.pdf

5. Do you agree that the policy of the UK Government and devolved administrations should promote the use of on-site disposal of radioactively contaminated waste from the decommissioning of nuclear sites, subject to environmental permits? Please provide the reasoning behind your response.

6

Decommissioning and clean-up of the UK's nuclear facilities

6.1 We are seeking views on proposals to update the policy on nuclear decommissioning. A draft of an updated nuclear decommissioning policy statement is set out in Part II, chapter 9. Here we set out why we think the policy needs to be updated and give a high-level overview of its proposed content.

6.2 Current policy is set out in the 2004 Statement of the UK Government and devolved administrations of Scotland and Wales', Policy on *The Decommissioning of the UK Nuclear Industry's Facilities.*[34] This updated and replaced the previous Statement contained in paragraphs 120 -131 of Command Paper 2919.

Current policy on decommissioning

6.3 Some aspects of the policy for decommissioning of nuclear facilities in the UK are reserved. However, the policy on the management of the radioactive waste arising from nuclear decommissioning and clean-up activities is devolved. In addition, under the Energy Act 2004, Scottish Ministers are consulted on matters relating to the nuclear sites in Scotland which are the responsibility of the NDA, and, in parallel with the UK Government, approve the NDA's strategies and business plans in relation to Scotland. Consequently, the UK Government and the devolved administrations of Scotland and Wales work closely together when developing policy on nuclear decommissioning and clean-up. This is reflected in the 2004 policy statement. Northern Ireland does not have any nuclear facilities and so the policy does not extend to Northern Ireland.

6.4 The 2004 policy covers all (existing and new) UK nuclear facilities and their sites. This includes power stations, other reactors, research facilities, fuel fabrication and reprocessing plants, and laboratories on civil sites licensed under the Nuclear Installations Act 1965.[35] It also includes the site at Culham used for research into fusion and, where relevant, facilities on Defence Nuclear Programme Sites.

6.5 The current policy is based on international standards, in particular, IAEA Safety Standards for protecting people and the environment - *Decommissioning of Facilities:*

[34] UK Government Statement (2004). Available at: https://www.gov.uk/government/publications/the-decommissioning-of-the-uk-nuclear-industrys-facilities
[35] UK Government (1965). Available at: https://www.legislation.gov.uk/ukpga/1965/57

*General Safety Requirements Part 6 (*No. GSR Part 6).[36] Additionally, as a Contracting Party to the *Convention on Nuclear Safety*[37] and the *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*,[38] the UK's decommissioning policy also complies with these conventions. We will continue to comply with these specific requirements and meet internationally agreed standards.

Why update the policy?

6.6 Decommissioning and clean-up of our nuclear facilities remains a priority across the UK. We must continue to reduce the hazards and risks not only for ourselves, but for future generations. In order to do so we need up-to-date policy that sets out clearly our aims and objectives.

The meaning of "clean-up" and "decommissioning", in relation to a site or installation, is defined by section 37 of the Energy Act 2004[39] as including:

(a) the treatment, storage, transportation, and disposal of hazardous material and of other matter and substances that need to be dealt with or removed in or towards making the site or installation suitable to be used for other purposes; and

(b) the construction of buildings and other structures to be used in connection with the cleaning-up or decommissioning of the site or installation.

6.7 There have been a number of significant developments and changes since the current policy was published in 2004. These include:

- the recent publication of the 2022 British Energy Security Strategy.[40] The strategy includes the UK Government's ambition to increase electricity generation capacity from civil nuclear power to up to 24 gigawatts by 2050. The UK government will also collaborate with other countries to accelerate work on Small Modular Reactors (SMRs) and Advanced Modular Reactors (AMRs);
- establishment of the NDA under the Energy Act 2004, and the progress made since 2004 to decommission and clean-up the UK's 17 nuclear legacy sites.

[36] IAEA (2014). IAEA Safety Standards: Decommissioning of Facilities. Available at: https://www.iaea.org/publications/10676/decommissioning-of-facilities
[37] IAEA (1994). Convention on Nuclear Safety. Available at: https://www.iaea.org/topics/nuclear-safety-conventions/convention-nuclear-safety
[38] IAEA (1997). Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste management. Available at: https://www.iaea.org/topics/nuclear-safety-conventions/joint-convention-safety-spent-fuel-management-and-safety-radioactive-waste
[39] UK Government (2004). Available at: https://www.legislation.gov.uk/ukpga/2004/20/section/37
[40] UK Government (2022): *British Energy Security Strategy.* Available at: https://www.gov.uk/government/publications/british-energy-security-strategy

In particular, the NDA's review and change to its baseline strategy from blanket deferred dismantling for the Magnox reactor fleet to site-specific strategies for each Magnox site which would involve a mix of decommissioning strategies;[41]

- the transitioning of Sellafield from an operational site to a decommissioning and clean-up site following the end of reprocessing of Magnox spent nuclear fuel in July 2022;
- from June 2021 onward, the transfer of responsibility for decommissioning and clean-up of the seven Advanced Gas-Cooled Reactors (AGRs) to the NDA after the stations have ceased generation and the spent fuel has been removed.[42] The first of these stations has now ceased generation and the remaining stations will all be closed by 2028;
- the UK Government's policy commitment in 2018 to amend the regulatory framework for the final stages of nuclear decommissioning and clean-up;[43]
- significant advances in research and development which have progressed the decommissioning programme and resulted in cost efficiencies;
- the process currently underway in England and Wales to identify a suitable location for a GDF;
- progress on the fusion energy research programme;
- the construction of the Low level waste facility (LLWF) at Dounreay;
- the establishment of Nucleus - the Nuclear and Caithness Archive – which allows for an improved approach towards recordkeeping to support future decommissioning projects.

6.8 There is also an increasing focus by the UK Government and devolved administrations of Scotland and Wales on the importance of efficient and timely decommissioning, and for decommissioning to be properly considered at the design stage of a facility. This includes, in England and Wales, the Generic Design Assessment (GDA)[44] for nuclear reactors – a joint process undertaken by the ONR, Environment Agency and Natural Resources Wales. The GDA helps to ensure that potential new reactor designs build in considerations for decommissioning and waste management at the very start of the lifecycle.

[41] UK Government (2021) Timing of the Magnox Reactor Decommissioning Strategy. Available at: https://www.gov.uk/government/case-studies/timing-of-the-magnox-reactor-decommissioning-strategy
[42] UK Government (2021). Available at: https://www.gov.uk/government/publications/decommissioning-edf-advanced-gas-cooled-reactor-agr-stations/advanced-gas-cooled-reactor-agr-decommissioning-factsheet
[43] Amending the Regulatory Framework for the Final Stages of Nuclear Decommissioning and Clean-Up" Government response, October 2018, Available at: https://www.gov.uk/government/consultations/the-regulation-of-nuclear-sites-in-the-final-stages-of-decommissioning-and-clean-up
[44] ONR. Generic Design Assessment (GDA) of new nuclear power stations. Available at: https://www.onr.org.uk/new-reactors/

6.9 In addition, industry has learned from the challenges involved in the decommissioning and clean-up of the nuclear legacy facilities. Significant progress has been made by industry in transforming the approach to the decommissioning and clean-up of the UK's nuclear facilities. Operators and public and private nuclear liability owners are proactively transforming the approach to nuclear decommissioning through:

- an agile, and sustainable approach to decommissioning;
- innovative approaches to tackling the decommissioning challenges including the use of robotics as well as an ambition to increase standardisation on NDA sites where appropriate;
- technology and expertise transferred from the non-nuclear sectors;
- application of the waste hierarchy to the waste arising from decommissioning activities including prevention or minimisation, better characterisation, treatment, reuse;
- decommissioning and radioactive waste management thinking through-out the lifecycle of the activities.

6.10 As a result, it is the view of the UK Government and devolved administrations of Scotland and Wales that the current policy should be updated to reflect the improvements and change in focus in the nuclear decommissioning landscape more accurately. We consider that while much of the 2004 policy remains relevant, such as the requirement for decommissioning strategies and plans, and for adequate funding, it is time to update the policy where necessary to reflect the developments and changes set out above, and to set the future direction of nuclear decommissioning and clean-up.

Proposal for an updated policy

Key aims of the updated policy

6.11 Through the proposed updated policy statement set out in Part II, the UK Government and devolved administrations of Scotland and Wales want to encourage industry to seek further opportunities to optimise, accelerate, and reduce the cost of the decommissioning and clean-up programmes for the NDA estate and the operating fleet owned by EDF Energy. These are 100+ year programmes with costs currently estimated around £271.6 billion (discounted) for the NDA estate and around £23.5 billion (undiscounted) for the EDF Energy fleet over the lifetime of the programmes.

6.12 We also want to set out our ambition for the UK to continue to be a world leader and influencer in the field of nuclear decommissioning and clean-up through promoting good practice and sharing expertise and experience.

Overview of proposed content of updated policy

6.13 The proposed updated policy statement would retain elements of the current policy that continue to remain relevant such as the requirement for decommissioning strategies and plans.

6.14 In addition, the proposed updated policy statement sets out our expectation that innovative and sustainable approaches to decommissioning and clean-up should be pursued. This means drawing on learning from the nuclear sector, the wider non-nuclear sector, the underpinning research activities at national laboratories and universities, and the international arena.

6.15 The proposed policy update makes it clear that the UK does not recognise entombment as a decommissioning strategy, whereby all or part of the facility is encased in a structurally long-lived material. This is not considered an option where the permanent shutdown of a facility has been planned. In the UK, entombment may only be considered under exceptional circumstances, for example, following a severe accident. This position is in line with the IAEA's safety standards.[45] It is not the same as on-site disposal (including in-situ disposal) which is discussed in Part I, chapter 5.

6.16 In addition, the proposed policy update sets out our expectation that:

- the land on which publicly owned nuclear facilities are located may be a key strategic asset and should be considered first for the location of national infrastructure. This could include, in England and Wales, supporting the UK Government's ambition to increase electricity generation capacity from civil nuclear power to up to 24 gigawatts by 2050. For sites that are the responsibility of the NDA our expectation is that the NDA's strategy and annual business plans should take into account wider policy of the UK Government and devolved administrations of Scotland and Wales, and the best strategic future use of NDA sites;
- the nuclear sector, research institutions and the relevant regulators should maintain sufficient subject matter experts, knowledge, skills and facilities taking into account the long timescales for the decommissioning and clean-up programmes;
- the sector should share learning, and support the supply chain including taking account of decommissioning synergies with other sectors' research and development objectives. This would enhance the sector's standing on the domestic and international stage;
- any new facility covered by the updated policy, including treatment and storage facilities, should be designed, built and operated so as to minimise

[45] IAEA, Decommissioning of Nuclear Power Plants, Research Reactors and Other Nuclear Fuel Cycle Facilities. Available at: https://www.iaea.org/publications/12210/decommissioning-of-nuclear-power-plants-research-reactors-and-other-nuclear-fuel-cycle-facilities

the complexity of subsequent decommissioning and associated waste management operations and costs across the full waste lifecycle. This approach would ensure the minimisation of radioactive waste generated over the lifecycle of the facility and avoid the creation of unplanned or unresolved decommissioning challenges that require resolution by future generations;

- environmental impacts and greenhouse gas emissions should be minimised through, among other things, consideration of reuse or recycling materials and assets wherever possible before they become waste;
- the wider socio-economic and environmental benefits of decommissioning and clean-up should be maximised;
- for decommissioning, a different mindset and skills are required compared to that for an operating facility. This should be considered during the early stages of decommissioning planning as a facility transitions from operation to decommissioning;
- uncertainty e.g. over the long timescales for the decommissioning and clean-up programmes, availability of waste disposal routes, should be effectively managed;
- there should be support of the supply chain to prepare for and invest in nuclear decommissioning and clean-up by reducing barriers to entry, providing enough confidence of a sustainable flow of work, creating jobs, and focussing on innovation;
- a lifecycle approach should be taken to decommissioning and clean-up. We consider this to be key to good-decision-making, optioneering and prioritisation;
- Best Available Techniques, Best Practicable Means and the waste hierarchy should be applied to achieve the best overall outcomes for people and the environment by optimising the management of radioactive waste (see Part I, chapters 4 and 5);
- accurate records should be maintained retained and archived, taking account of the long timescales for nuclear decommissioning and clean-up;
- the nuclear decommissioning sector should look to adopt common processes and capabilities - standardisation - where it is appropriate to do so. The objective should be to further increase decommissioning efficiency and maximise the value of work or innovation undertaken by the industry as a whole.

6. Are there any further improvements that we might consider in relation to the proposed update of the nuclear decommissioning and clean-up policy? Please provide the reasoning behind your response.

7

Nuclear materials and spent nuclear fuel

7.1 In this chapter we discuss the management of nuclear materials and spent nuclear fuel. Nuclear materials principally include, uranium, and plutonium. Policy for the management of nuclear materials and spent nuclear fuel is a reserved matter.

7.2 We are seeking views on:

- updating our policy on spent fuel management and replacing paragraphs 64 and 65 of the 2008 nuclear power white paper, *Meeting the Energy Challenge*[46] in order to reflect developments in the new and advanced nuclear power sectors;
- a new policy statement on the management of uranium.

7.3 We are not proposing any changes to existing policy on plutonium.[47]

7.4 The proposed UK-wide policy framework for the management of nuclear materials and spent fuel is set out in full in Part II, chapter 11.

Spent fuel management

7.5 Spent fuel is nuclear fuel that has been used in a nuclear reactor and then permanently removed from it. As a pioneer of civil nuclear power, the UK manages a range of spent fuels which require bespoke lifecycle management solutions.

7.6 Current policy on the management of spent fuel is contained in several documents. We propose to update these to reflect recent developments and bring them together in a single coherent policy statement that sets out the UK Government's expectations on appropriate approaches for spent fuel management. Current policy as set out in paragraphs 64 and 65 of the 2008 White Paper is clear that in the absence of any proposals from industry for reprocessing spent fuel new nuclear projects should proceed on the basis that spent fuel will not be reprocessed. Our proposed amendments are intended to clarify this position as the new and advanced nuclear power sector develop.

[46] UK Government (2008). Meeting the Energy Challenge: A white paper on nuclear power. Available at: https://www.gov.uk/government/publications/meeting-the-energy-challenge-a-white-paper-on-nuclear-power
[47] Nuclear Decommissioning Authority (2019). Available at: https://www.gov.uk/government/publications/progress-on-plutonium-consolidation-storage-and-disposition

7.7 The proposed updates are as follows:

- the UK Government's policy is that the decision of whether or when to reprocess spent fuel is a matter for the owner of the spent fuel;
- whilst industrial scale reprocessing of spent fuels in the UK has ended, the UK Government recognises the value of the UK's nuclear fuel cycle knowledge and skills base, both in managing the UK's nuclear legacy and its existing liabilities and in supporting future capabilities and research programmes in the sector. New and advanced reprocessing technologies, with integrated waste management, may be developed in the future which support advanced nuclear reactor systems. The UK Government is continuing to support the advanced nuclear sector through investments in research facilities and programmes;
- however, while the decision to reprocess spent fuel continues to rest with the owner of the fuel, in the absence of new or advanced proposals from industry new nuclear power stations should proceed on the basis that spent fuel will not be reprocessed and waste management plans including financing should reflect this. Any proposals for future reprocessing of spent fuel would need to be in line with regulatory and policy requirements for the management of all nuclear materials and radioactive waste streams. Should any proposals for reprocessing come forward in the future, they would need to be considered on their merits at the time and the UK Government would expect to consult on them.

7.8 The proposed updated and consolidated policy statement, including relevant background information, is laid out in full in Part II, chapter 11.

7. Do you agree with our proposed updates to the policy statement on the management of spent fuel? Please provide the reasoning behind your response.

Uranium Management

7.9 Uranium is the raw material used for today's nuclear fuel. There is a diverse range of materials containing uranium currently held in the UK and the potential for more to arise in the future. This diverse range of materials require bespoke lifecycle management solutions.

7.10 There is no extant policy in the UK concerning the management of uranium. We are therefore looking to provide clarity on how the UK Government expects uranium to be managed. The proposed policy statement on uranium management, including relevant background information, is laid out in full in Part II, chapter 11.

7.11 The proposed policy statement on the management of uranium recognises the following:

- there is a diverse range of materials containing uranium held in the UK and the potential for more to arise in the future for which there may be no single lifecycle management option. The UK Government's policy on the management of uranium is to maintain flexibility to allow for different management options;
- decisions on management of uranium, including re-use, should continue to be a matter for the owner of the uranium, subject to meeting necessary regulatory requirements, compliance with any applicable inter-governmental agreements, and the UK's nuclear safeguards obligations;
- the UK Government expects that uranium which has the potential for re-use should be defined accordingly and should not be categorised as waste whilst a future use can be foreseen. If a future use cannot be foreseen, it is the responsibility of the owner of the uranium to decide whether to categorise it as waste for permanent disposal;
- the UK Government supports the NDA in taking ownership of overseas-owned uranium that it manages in order to close out historic spent fuel reprocessing contracts and associated liabilities. This is subject to meeting necessary regulatory requirements, compliance with any applicable inter-governmental agreements, and the UK's nuclear safeguards obligations;
- the UK Government recognises the wider societal and sustainability benefits which can be achieved through the re-use of uranium for purposes other than in the nuclear fuel cycle, provided that any applicable nuclear safeguards obligations and other regulatory requirements continue to be met.

8. Do you agree with our proposed policy statement on the management of uranium? Please provide the reasoning behind your response.

8

Consultation questions

1. **Do you agree with the proposal to require the application of a risk-informed approach as a decision-making framework for the management of all solid radioactive waste? Please provide the reasoning behind your response.**
2. **Do you agree that application of the waste hierarchy should be an explicit policy requirement for the management of all solid radioactive waste where practicable? Please provide the reasoning behind your response.**
3. **Do you agree with the proposed amendment to current policies on geological disposal to allow disposal of ILW in near surface facilities? Please provide the reasoning behind your response.**
4. **Do you agree with the proposed policy framework for the development of near surface disposal facilities by the NDA for the disposal of less hazardous ILW? Please provide the reasoning behind your response.**
5. **Do you agree that the policy of the UK Government and devolved administrations should promote the use of on-site disposal of radioactively contaminated waste from the decommissioning of nuclear sites, subject to environmental permits? Please provide the reasoning behind your response.**
6. **Are there any further improvements that we might consider in relation to the proposed update of nuclear decommissioning and clean-up policy? Please provide the reasoning behind your response.**
7. **Do you agree with our proposed updates to the policy statement on the management of spent fuel? Please provide the reasoning behind your response.**
8. **Do you agree with our proposed policy statement on the management of uranium? Please provide the reasoning behind your response.**

Annex 1

Privacy Notice

Personal data

The following is to explain your rights and give you the information you are entitled to under the Data Protection Act 2018 and UK General Data Protection Regulation (UK GDPR).

Note that this section only refers to your personal data (your name address and anything that could be used to identify you personally) not the content of your response to the consultation.

1. The identity of the data controller and contact details of our Data Protection Officer

The data controller for your personal data is the Department for Energy Security and Net Zero You can contact the DESNZ Data Protection Officer at:

DESNZ Data Protection Officer

Department for Energy Security and Net Zero

1 Victoria Street

London

SW1H 0ET

Email: dataprotection@beis.gov.uk.

2. Why we are collecting your personal data

Your personal data is being collected as an essential part of the consultation process, so that we can contact you regarding your response and for statistical purposes. We may also use it to contact you about related matters.

3. Our legal basis for processing your personal data

The Data Protection Act 2018 states that, as a government department, DESNZ may process personal data as necessary for the effective performance of a task carried out in the public interest. i.e. a consultation.

4. With whom we will be sharing your personal data

We will be sharing your personal data with the following:

- Northern Ireland Executive
- Scottish Government
- Welsh Government

5. Your rights

- You have the right to request information about how your personal data are processed, and to request a copy of that personal data.
- You have the right to request that any inaccuracies in your personal data are rectified without delay.
- You have the right to request that any incomplete personal data are completed, including by means of a supplementary statement.
- You have the right to request that your personal data are erased if there is no longer a justification for them to be processed.
- You have the right in certain circumstances (for example, where accuracy is contested) to request that the processing of your personal data is restricted.
- You have the right to object to the processing of your personal data where it is processed for direct marketing purposes.
- You have the right to object to the processing of your personal data.
- You have a right to lodge a complaint with the independent Information Commissioner (ICO) if you think we are not handling your data fairly or in accordance with the law. You can contact the ICO at https://ico.org.uk/ , or telephone 0303 123 1113.

6. Storage of your data

As your personal data is stored on our IT infrastructure and shared with our data processors Microsoft and Amazon Web Services, it may be transferred and stored securely outside the UK and European Economic Area. Where that is the case, it will be subject to equivalent legal protection through the use of Model Contract Clauses.

7. Complaints

If you consider that your personal data has been misused or mishandled, you may make a complaint to the Information Commissioner, who is an independent regulator. The Information Commissioner can be contacted at:

Information Commissioner's Office, Wycliffe House
Water Lane
Wilmslow
Cheshire
SK9 5AF

Any complaint to the Information Commissioner is without prejudice to your right to seek redress through the courts.

Annex 2

Analysis of UK Radioactive Waste and Materials Inventory data – Intermediate level waste generated in England and Wales

1. During exploratory work on near surface disposal for ILW, the NDA carried out a project to identify which ILW streams may be suitable for disposal in one of the two different near surface disposal facility concepts; at surface and at depth.

2. The raw data of the ILW streams in the 2019 UKRWI has been analysed and assessed in a number of different ways to produce several different outputs. These outputs include information on the radiological, volumetric and material composition of the waste streams potentially suitable for near surface disposal. Inventory calculations were carried out in line with international best practice; the sum of fractions approach.[48]

All ILW in UKRWI 2019

ALL UKRWI ILW WASTE	Raw ILW Waste volume (m^3)	Number of Waste Streams
Stocks	102,040	499
Arisings	145,321	296
Total	247,361	633

3. Raw waste is referred to as ‘reported volume’ in the UKRWI, and is the volume actually taken up by waste, for example within the tanks, vaults or drums that contain them at the moment. The majority of the ILW streams are on the Sellafield site, in west Cumbria, closely followed by the 10 Magnox sites, distributed throughout England and Wales.

[48] IAEA (2003) Derivation of activity limits for the disposal of radioactive waste in near surface disposal facilities IAEA-TECDOC-1380 December 2003. Available at: https://www-pub.iaea.org/MTCD/publications/PDF/te_1380_web.pdf

Material Type

4. Of the waste streams potentially suitable for near surface disposal, the material types that dominate are; cementitious material, graphite, stainless steel and other ferrous metals (such as mild steel).

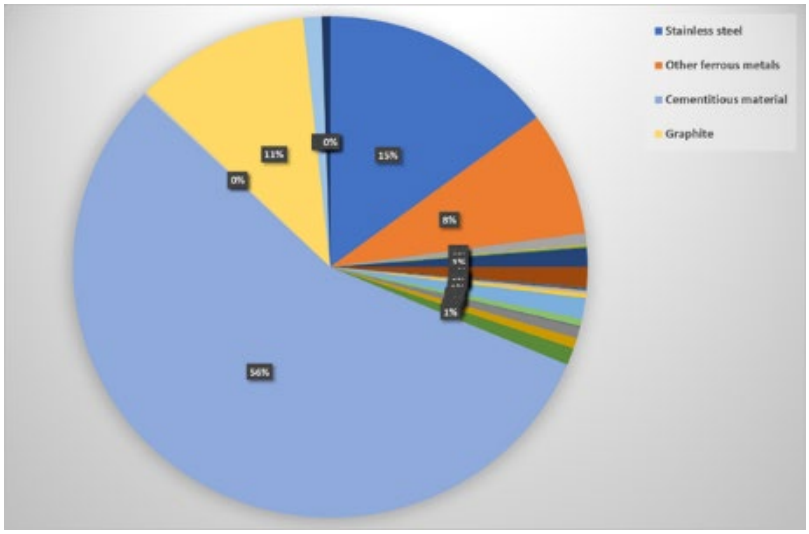

Figure 6.Suitable waste types for at surface concept

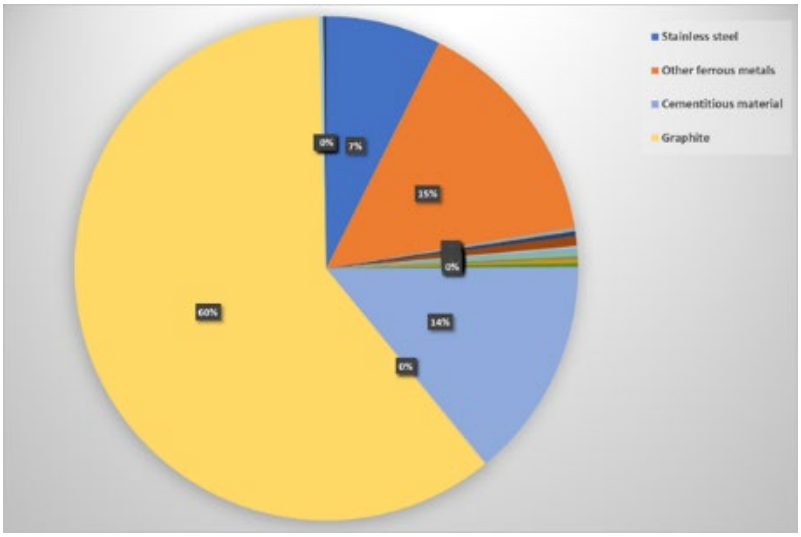

Figure 7. Suitable waste types for at depth concept

Radioactivity and volume

5. One element of the UKRWI data that NDA assessed was the radiological content of the potentially suitable waste streams. What was evident from the investigatory work was the potentially suitable waste streams for near surface disposal contained very little of the overall radioactivity associated with the ILW streams in UKRWI.

6. Although the potentially suitable waste streams represent very little radioactivity of the overall ILW in UKRWI, they do represent a more significant volume of ILW currently destined for disposal in GDF. The initial assessment indicated that potentially up to

around 40% of the total volume of ILW in UKRWI could be suitable for disposal in a near surface environment.

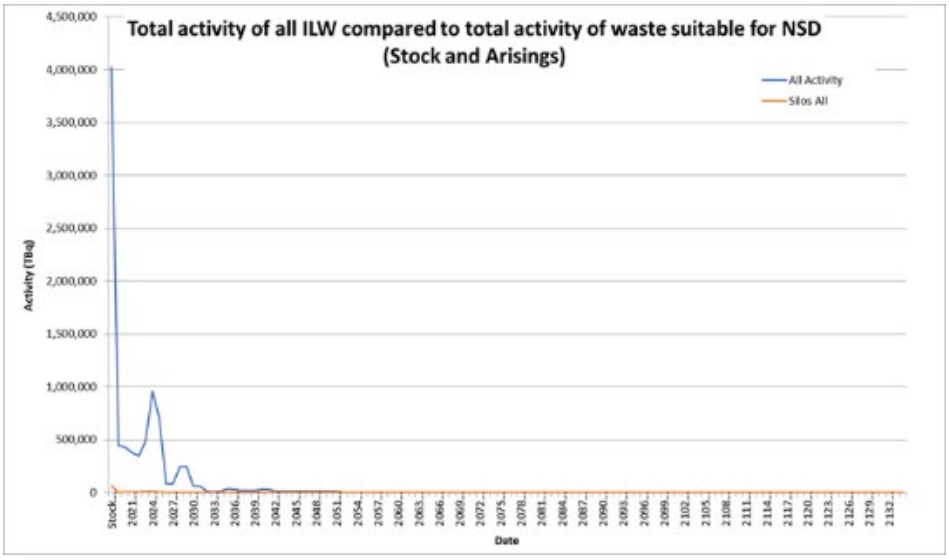

Figure 8. Total radioactivity in all ILW streams vs radioactivity in waste streams potentially suitable for near surface disposal (Orange line represents the potential waste streams suitable for an at depth near surface disposal facility, which has the potential to support disposal of more radioactivity than an at surface near surface disposal).

Annex 3

Initial cost benefit analysis for near surface disposal of intermediate level waste

1. The NDA has carried out some initial cost benefit analysis alongside its work to assess the technical feasibility of near surface disposal for suitable ILW in England and Wales. A robust business case would need to be developed in order for the NDA to take forward any proposals to construct a near surface facility for the disposal of ILW. This initial analysis is focused on the at surface near surface disposal concept with a first waste emplacement date in the early 2030s and assumes an entirely new facility, rather than extension of an existing facility.

2. Initial estimates from the NDA are that diverting less hazardous ILW from a GDF to near surface facilities could save between ~£300m and ~£450m (2020, monetary value). These are total lifetime savings. The NDA has estimated that in the medium term – over the next 25 years disposing of ILW in a near surface disposal facility could save between ~£100m and ~£150m (2020, monetary value). If the LLWR were to be extended to take ILW there would be an additional saving of around £160m.

3. The savings come from:

    - the need for one less storage facility for ILW (until a GDF becomes available);
    - a reduced number of vaults in a GDF;
    - savings on interim storage costs across the rest of the NDA estate (decommissioning Magnox reactors).

4. The estimated savings do not include potential savings from waste packaging where near surface disposal waste acceptance criteria are likely to differ from those of a GDF. In addition, savings due to early site clearance (hotel costs) are not considered. The assumptions used to estimate the cost benefit of near surface disposal for ILW are set out below.

Assumptions

Volumes of ILW potentially suitable for near surface disposal (vault concept)

5. The NDA has estimated that 6,000m^3 to 10,000m^3 of ILW (packaged volumes) assumed to go to a GDF could be suitable for surface disposal. This is based on a first waste emplacement date of early 2030s.

Methodology

6. Until the environmental safety case for a near surface disposal facility has been made, we cannot know for certain how much ILW is suitable for near surface disposal. Hence, the NDA is taking a conservative approach throughout its investigatory work. The work so far has considered two realistic scenarios for the surface vault concept of near surface disposal to evaluate the potential suitable inventory. The conclusion of this work is shown in scenario A and scenario B in Table 1 below. By 2040 there could be between 14,000m$_3$ and 21,000m^3 of waste that could go to a near surface disposal facility depending on the eventual waste acceptance criteria (WAC) for the facility. Of that volume between 6,000m^3 and 10,000m^3 are already in storage and could be disposed of in a near surface facility with waste emplacement beginning in 2030 (depending on the WAC for the facility). Annex 2 gives more information about the work NDA carried out to identify potentially suitable waste streams.

Scenario A: Packaged volume (m^3) potentially suitable for near surface disposal			Scenario B: Packaged volume (m^3) potentially suitable for near surface disposal		
Stock	Arisings	Total	Stock	Arisings	Total
6,000	8,000	14,000	10,000	11,000	21,000

Table 1: Potential packaged volume of waste streams suitable for near surface disposal arising by 2040. (Source: NDA). Numbers have been rounded to the near thousand and show ILW currently in storage (stock) and ILW that is expected to arise by 2040 (arisings).

7. The term packaged volume is used in the UKRWI for the volume taken up by waste following conditioning and the container it is packaged in. It represents the final waste volume. Some waste packages are shaped such that they effectively take up more volume within a storage facility than their absolute volume, for example rectangular containers with rounded edges take up an effective rectangular volume.

Whole lifecycle cost of a near surface disposal facility for ILW

8. The NDA has estimated that a near surface disposal facility based on the vault concept could have a lifecycle cost of £360m. This includes design, construction, and operations. The estimate was developed in line with guidance contained in HM Treasury's Green Book on how to appraise polices, programmes and projects.

9. To calculate the lifecycle cost of a near surface disposal facility, the NDA added capital expenditure (~£45m) to the potential operating cost of the facility. Capital expenditure has been calculated by summing the base cost estimate (~£35.2m) with total contingency (£9.6m).

10. The operating cost of the facility (£315m) was calculated by multiplying the number of years in operation (45 years) by the annual cost of operating the LLWR as a reference (£7m). Cost estimates for building a vault were informed by the actual costs of building Vault 9 in the LLWR and on the cost of vaults at the LLW disposal facility in Dounreay. No additional overheads were assumed. Total lifecycle cost of a near surface disposal facility (£360m) = £45m + £315m (£7m*45 years).

Savings

Cost avoidance of building new storage facilities for ILW

11. The NDA estimates that it will need to build one less store for ILW if a near surface disposal facility is available for waste emplacement by the early 2030s. The avoidance of constructing and operating this store is estimated to result in cost savings of ~£610m. This estimate is based on the cost of the construction of a Box Encapsulation Plant Product Store (BEPPS) at Sellafield. Sellafield estimates the construction cost of BEPPS could be £250m and once constructed the facility will need to be operated for about 60 years at a total cost of £360m (or £6m per year).

12. A near surface disposal facility also offers opportunities for additional cost savings in relation to the Magnox interim storage programme. The NDA estimates that these savings could be around £45m if construction of an additional store is avoided for waste arising from decommissioning the Magnox reactors, and the stores currently operating can be emptied sooner than planned. The extent to which these opportunities can be realised is uncertain as Magnox is currently updating its decommissioning plans.

Cost savings from reduced number of vaults in a GDF

13. For the purpose of these cost estimates the NDA has assumed a GDF will be available in the 2040s and is estimated to cost approximately £13bn.[49] However, there is high uncertainty attached to the cost estimate for the whole life cost of a GDF not least because a site has yet to be identified. The cost estimate is sensitive to several factors including: the type of rock and the geological environment in which the facility is constructed; the nature and volume of the inventory for disposal; and how long the facility operates before being closed.

14. Based on the estimates of volumes of ILW suitable for near surface disposal, the construction of a near surface facility would remove the need for some of the vaults currently planned in a GDF, resulting in savings up to £150m.

		Lower Bound	Upper Bound
Near Surface Disposal Costs	£m	360	360
Savings Sellafield	£m	550	610
Savings Magnox Sites	£m	0	45
Savings GDF	£m	104	150
Net Savings	£m	294	445

Table 2: Summary of costs and benefits (Source: NDA).

[49] The NDA is in the process of revisiting its assumptions in the light of the revised costs for a GDF (£20-£53billion) and expected first waste emplacement date, which is now 2050-2059.