

# Low Level Waste Repository

Information about our regulation of the site

August 2014



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# 1. The Low Level Waste Repository

The Low Level Waste Repository (LLWR) is a site near Drigg in West Cumbria which is the national UK facility for the disposal of solid, predominantly, low level radioactive waste (LLW). The site was previously the location of a Royal Ordnance Factory for the Ministry of Defence until 1959 when it became a radioactive waste disposal site. The site receives, handles and disposes of radioactive wastes from across the UK by burial. A wide range of industries use the LLWR to dispose of their wastes, including the civil and private nuclear industry as well as hospitals, universities and other non-nuclear users of radioactive substances. Until around 1990 wastes were disposed of in trenches which were then covered in a manner similar to most domestic landfills. Subsequently waste has been grouted in place within large metal containers known as ISO-containers and disposed of within highly engineered concrete vaults.

## 1.1. The management of waste at the Low Level Waste Repository

The Low Level Waste Repository is a dedicated site for the disposal of radioactive wastes. The radioactive wastes that are allowed to be disposed at the site are those which meet the requirements of the Environmental Safety Case (ESC) and permit at the site – predominantly waste defined as Low Level Waste (LLW). Waste is received by rail or road within large metal containers known as ISO-containers. The waste is grouted in place within the container to provide physical and chemical stability to the waste. It is then disposed of within highly engineered concrete vaults. The site operates its own grouting facility and also manages the leachate and surface run-off generated by the site. Subject to permitting and planning, the operators hope to construct and fill further vaults for several more decades, taking much of the UK's LLW. Once the vaults are full the intention is to isolate the disposed waste from the environment using vertical cut-off walls and a robust cap incorporating protective layers. The site will continue to be actively managed for a significant period of time (possibly around 100 years) and until it can be demonstrated the waste is safe enough to remove any control over the site (i.e. the site no longer needs to be secured or managed).

## 1.2. Ownership and operation of the Low Level Waste Repository

The site is owned by the Nuclear Decommissioning Authority (NDA) on behalf of the government. The NDA contracts the operation of the site to LLW Repository Ltd, which is the site licence company that is permitted to dispose of waste and to operate the nuclear licensed site. NDA also contracts the management of the site licence company to a 'Parent Body Organisation', a contractual mechanism which allows for competition for the management from time to time as a means to help drive improvements in performance at the site. Since 1 April 2008 the Parent Body Organisation (PBO) of LLW Repository Ltd has been UK Nuclear Waste Management Ltd (UKNWM Ltd). UKNWM Ltd is a consortium led by URS, along with Studsvik UK, Areva and Serco Assurance. The current contract between UKNWM Ltd and the NDA runs until 31st March 2018.

# 2. Low Level Waste

Low Level Waste (LLW) is radioactive waste or material that is contaminated by radioactivity through its use. From operating facilities it is generally paper, plastics, protective clothing, cardboard and scrap metal. When facilities cease operating and are dismantled there may also be building rubble, soil and steel items such as pipework. LLW is defined, in the UK Low Level Waste Policy (1) as: "radioactive waste having a radioactive content not exceeding 4 gigabecquerels per tonne (GBq/te) of alpha or 12 GBq/te of beta/gamma activity (2). Gigabecquerels being a measure of radioactivity. LLW makes up more than 90 per cent of the UK's radioactive waste legacy by volume, but because the radioactive content of such material is low, it contains less than 0.1 per cent of the total radioactivity. Because of its low radioactive content, LLW is suitable for disposal in near surface disposal facilities such as the Low Level Waste Repository (LLWR) near Drigg.

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The definition of LLW encompasses a wide range of levels of radioactivity, however most of the LLW that is generated in the UK has only very low levels of radioactivity associated with it. Most of this can be disposed of safely to landfill rather than the LLWR. The use of such routes for lower activity waste is important to protecting the capacity of the LLWR and ensuring it remains available for the waste that does need the level of protection it affords. Low volumes of very low level waste, mainly from hospitals and universities, can be disposed as 'exempt' radioactive waste, without requiring any permit. Higher volumes and slightly more radioactive LLW, predominantly from the nuclear industry, can be disposed at landfills which are specifically permitted to receive and dispose of such wastes alongside other non-radioactive wastes.

There are two categories of radioactive waste that are more radioactive than LLW, these are Intermediate Level Waste (ILW) and High Level Waste (HLW).

Solid radioactive waste may have non-radiological hazards associated with them. We require these to be disposed of in such a way that the level of protection provided to people and the environment is consistent with the national standards at the time of disposal for other hazardous waste disposal.

It is important to understand that the current permit at the LLW Repository requires that the radioactivity level of the whole consignment of waste being received, for instance an ISO freight container, needs to be below certain limits (4GBq/tonne alpha and 12GBq/tonne beta/gamma radiation) when measured as an average over the whole container. This means that some waste in that container may slightly exceed these limits whilst others within the container may be significantly below these limits. It is the environmental safety case, required to be in place by the permit, which defines what is safe to be disposed of at the site, not any particular definition of waste. This is why our review of the ESC is an important part of any future consideration of permit variations.

## 2.1 The source of low level radioactive waste

Most of the UK's low level radioactive waste (LLW) comes from the nuclear power industry, including the production of nuclear fuel, operating nuclear reactors, spent fuel reprocessing, research and development activities and from the decommissioning and clean-up of old facilities. The remainder comes from the Ministry of Defence, mostly from production and decommissioning of nuclear weapons and operation of nuclear submarines; hospitals; non-nuclear industries (such as oil extraction), and educational and research establishments. The single largest source of Low Level Waste sent to the Low Level Waste Repository is the Sellafield site in West Cumbria.

## 2.2 Minimisation of low level radioactive waste generation and disposal

The policy for the long term management of solid low level radioactive waste (LLW) in the United Kingdom (1) (the UK Low Level Waste Policy) encourages the amount of waste requiring disposal to be minimised and considers disposal to be the option of last resort. This policy required the Nuclear Decommissioning Authority (NDA) to develop a UK Nuclear Low Level Waste Strategy (3). The strategy was developed with the participation of various waste producers, regulators and local council representatives, and was published in 2010 following public consultation. The strategy seeks the use of the waste management hierarchy within the nuclear industry, in that waste should not be created if possible, but if it is it should be re-used or recycled. Where disposal is necessary, the strategy looks for disposal in appropriate facilities. For example use of landfill disposal of LLW with lower levels of activity that does not need the level of engineered containment provided by the Low Level Waste Repository in order to ensure safe disposal. Following publication of the strategy, NDA have led work to implement a wide range of initiatives to improve waste management across the industry.

Recently NDA has started a review of the UK Nuclear LLW Strategy. Consultation on any revision is expected to take place in January 2015 and a revised version published by summer 2015. This is expected to take account of the development of a range of alternatives to the LLWR for LLW management since the

first publication and a greater emphasis on the need for an integrated approach to the management of radioactive wastes in order to secure a robust, sustainable infrastructure. Integration issues will consider not only the benefits of integration of waste volumes for treatment from within the nuclear sector but also taking account of wastes from non-nuclear sectors where practicable. Also, to give more emphasis on managing waste according to its characteristics and disposability rather than its radioactive waste category.

In 2012 UK Government published a strategy for non-nuclear anthropogenic LLW (from hospitals and universities etc), and work is currently near completion (led by Scottish Government) to develop a UK strategy for the management of Naturally Occurring Radioactive Material (NORM) wastes, arising predominantly from the oil and gas and other extractive industries. Following consultation earlier in the year a UK NORM Strategy is due to be published in summer 2014. Both non-nuclear strategies similarly apply the principles of the Waste Management Hierarchy and proximity principle (see Section 5) amongst others.

Waste minimisation is also a central requirement in all environmental permits with an obligation on operators to apply the Best Available Techniques (BAT) to limit wastes. The Environment Agency works with operators, providing advice and guidance to aid continual improvement in waste management.

## 2.3 Quantities of radioactive waste in the UK

Estimates of the volumes of Low Level Waste (LLW) that will need to be managed between now and 2129 have been generated using national inventory data for the nuclear industry (4). These estimate around 1.1 million m<sup>3</sup> of LLW and around 3.3 million m<sup>3</sup> of Very Low Level Waste will be produced. In addition the recent consultation on the strategy mentioned in section 2.3 on 'NORM' waste has highlighted considerable volumes of low activity wastes that may be generated from non-nuclear industries, for instance as a result of decommissioning onshore and offshore oil and gas installations. The Low Level Waste Repository (LLWR) is unlikely to be able to take all of this waste and, as discussed above, it would be inappropriate for all such wastes to be disposed of to such a highly-engineered facility. However, if LLW Repository Ltd is able to make a case for continued disposals the LLWR may be able to take a significant proportion of this waste and could remain operational for a number of decades. Capacity issues have already been eased by the implementation of waste minimisation initiatives at consigning sites and by the efficient use of other disposal facilities for lower activity waste (e.g. landfill disposal).

## 2.4 Categorisation and checking of waste

The different rules applying to disposal of different waste types oblige operators to properly characterise their wastes and segregate these into appropriate waste streams. This applies just as much to radioactive waste as to wastes deemed as 'hazardous' under different legislation. Such arrangements help ensure that wastes are not deliberately 'diluted' by mixing with other inert wastes, allows segregated wastes to be re-used or re-cycled where possible, and ensures that wastes are properly described and understood to enable their consignment and receipt at other sites for treatment and / or disposal. Waste producers must have management and control arrangements in place to ensure that they meet their permit requirements. We perform checks on these arrangements through site inspections and audits and by 'seizing' wastes consigned for disposal to confirm their composition. Additionally, we also expect the disposal site to apply appropriate checks on waste they receive to ensure it remains compliant with their disposal permit. These checks may include consignor audits, monitoring of received wastes or check monitoring of wastes during the disposal process.

# 3 The Environmental Safety Case and Our Review

## 3.1 The Environmental Safety Case

It is a legal requirement of the environmental permit held by the Low Level Waste Repository (LLWR) that the holder maintains an Environmental Safety Case (ESC). The ESC must demonstrate that members of

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the public and the environment are adequately protected, both at the time of disposals and in the future. An ESC is a collection of arguments, both qualitative and quantitative and using multiple lines of reasoning, that demonstrates understanding of the disposal system, uncertainties and safety. It must address a wide range of issues such as site understanding, inventory, human and non-human impacts, radiological and non-radiological impacts, engineering, design and uncertainty. The ESC must be consistent with the principles and requirements detailed in our Guidance on Requirements for Authorisation (GRA) (5) (requirements produced jointly with the environment agencies in Northern Ireland and Scotland). Once produced the ESC should be kept up to date and used actively as a site management tool.

In practice the ESC must be proportionate in size and detail to the risk presented by the site. As the LLWR receives radioactive wastes with a wide range of radiological, chemical and physical properties, and is a large complex site, the ESC is several thousand pages long, supported by many references.

## 3.2 The need for a new Environmental Safety Case

The last Environmental Safety Case (ESC) was submitted in 2002. Our review of that ESC identified a number of shortfalls and so in 2006 we authorised the site for disposals into the current vault only (Vault 8). We also required delivery of a number of improvement requirements, including an updated ESC by 01 May 2011. This updated ESC was required to demonstrate that continued disposals at the site are safe, now and into the future. Our review of the updated ESC forms the basis of our review of the current environmental permit and any decision on whether to allow continued disposals.

## 3.3 Process and timescales for review of the Environmental Safety Case and permit for the site

The Environmental Safety Case (ESC) was submitted to us by 01 May 2011. It was placed on our public register shortly after receipt, although at that point we did not actively seek comments. We reviewed the ESC, seeking further information from the operator as necessary. Our review has been detailed and is expected to be complete in early 2014 and published late 2014. On 28 October 2013 the operator made an application to us under the Environmental Permitting Regulations 2010 to dispose of further waste at the Low Level Waste Repository. We have placed this application on our public register and began a consultation upon it on 20 November 2013. Based upon the review of the ESC and the outcome of the application consultation we will prepare a draft decision, supported by a draft permit, upon which we will consult around winter 2014. Following consideration of all comments received we plan to publish our decision in 2015, along with any permit as appropriate. It should be noted that these timescales are approximate and subject to change dependent upon a number of factors such as the scale and extent of consultation comments and progress gaining other required permissions for further disposal at the site.

## 3.4 Guidance to support our review of the Environmental Safety Case

The review of the Environmental Safety Case (ESC) has been undertaken in accordance with the joint environment agencies Guidance on Requirements for Authorisation (GRA) (5), published in 2009, along with draft supplementary guidance issued in 2012 (6). This guidance explains the requirements that we, and the other environment agencies, expect a developer or operator to fulfil when they apply for a permit to develop or operate a near surface disposal facility for radioactive waste. The guidance sets out our radiological protection requirements and explains our regulatory process that leads to a decision on whether to permit radioactive waste disposal. It also describes the ESC we would expect from the developer/operator of a disposal facility. Important expectations in the guidance are set out using 5 Principles and 14 Requirements.

Our review is technical, seeking to establish whether the principles and requirements within the GRA have been adequately met. We look for application of sound science and engineering. We need to be convinced by robust, justified and underpinned arguments that continued disposals are safe against the safety criteria

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detailed within the GRA. We undertake a thorough review of the submitted material, seeking further information from the operator as necessary. Where we consider it appropriate we reproduce certain calculations or assessments, or we undertake more in depth audits to establish the robustness of underpinning information.

### **3.5 Environment Agency skills and capability to complete the review of the Environmental Safety Case**

The Environment Agency has a dedicated Nuclear Regulation Group (NRG) employing staff with many years experience in the nuclear industry and other industries that use radioactive substances, including radioactive waste disposal. This group has been regulating the Low Level Waste Repository (LLWR) for many years and has undertaken similar reviews in the past. NRG also has a Nuclear Waste Assessment Team (NWAT) employing specialist staff with experience in the assessment of nuclear waste issues, including waste disposal, gained through experience in the UK and international nuclear industry. NRG has led our review. Further support has been gained from the wider Environment Agency where we have significant experience in related areas such as landfill engineering, hydrogeology, landfill chemistry, coastal erosion and waste policy. Although the majority of expertise was accessed from within the Environment Agency, we also made use of some highly specialist skills outwith the Environment Agency, such as specialists on radiological impacts on non-human biota and Public Health England to advise on radiological impacts from higher activity particulate material.

### **3.6 Basis for the Environment Agency decision to authorise the Low Level Waste Repository operators to continue disposals into the existing vault in 2006 when shortfalls had been identified in the 2002 Environmental Safety Case**

At the time of our previous review we concluded that whilst the repository site was being managed in compliance with our regulatory controls (i.e. the operators were ensuring that limits and conditions within the authorisation were met), the impact from all the disposals on the Low Level Waste Repository (LLWR) would be very low. We issued a new authorisation which, in the interim period while remaining vault capacity was filled, kept limits whilst strengthening regulation and in particular required the site operators to address our concerns with regards to risk management on the site arising from the 2002 case.

### **3.7 Opportunities to influence the outcome of this review**

When we received the Environmental Safety Case (ESC) in May 2011 we placed it on our public register. It has also been on the LLWR web site at: <http://llwrsite.com/national-repository/key-activities/esc/>. During our review process we took into account any comments we received upon the ESC and relevant to it and made the operators aware of these. We have retained all comments received and will consider these as part of our determination of the application by LLW Repository Ltd for a revised permit to make further disposals.

On 28 October 2013 LLW Repository Ltd made an application to us under the Environmental Permitting Regulations 2010 to dispose of further waste at the Low Level Waste Repository. We began a consultation upon the application on 20 November 2013. Based upon the review of the ESC and the outcome of the consultation we will prepare a draft decision, supported by a draft permit, upon which we will consult around winter 2014. Following consideration of all comments received we will publish our decision in 2015, along with any permit as appropriate.

### 3.8 Consultation on the permit application and our draft decision and permit

We have a number of consultees that we consult as a matter of course for applications, dependent upon the scale and significance of the application and in accordance with our procedures. In this case, on the application, we have consulted the Office for Nuclear Regulation, Department of Health, Department for Energy and Climate Change, Department for the Environment Food and Rural Affairs, Food Standards Agency, Cumbria County Council, Copeland Borough Council, Public Health England (previously known as the Health Protection Agency), Drigg and Carleton Parish Council, the Committee on the Medical Effects of Radioactivity in the Environment (COMARE), County Council Health and Care Services, National Farmers Union, Northwest Inshore Fisheries and Conservation Authority and local pressure groups. We also consulted more widely with other interested groups and individuals. We expect to consult similarly on our draft decision and permit.

### 3.9 Timescales for our review of the Environmental Safety Case and permit application

Our review of the Environmental Safety Case (ESC) started in May 2011 and is expected to be concluded in 2014, with a decision on a future permit being reached in 2015. The ESC is large and complex. It has taken several years to produce and includes a wide range of research and assessment. It is a detailed submission that addresses each and all of the requirements of the Guidance on Requirements for Authorisation (GRA) (5). We believe our review has been proportionate to the size and complexity of the case, which is 10,000 pages plus, with many supporting references. Additionally, during our review we have found it necessary to seek further information from the operators. In total we have raised 72 'Issue Resolution Forms', the process we have used to raise additional questions of the operators to support the ESC. It has taken additional time for the operators to complete this work and then for us to review it.

Overall we believe our extensive review has been appropriate given the significance of the site to the UK nuclear and other industries and the potential impacts that could result from the inappropriate disposal of radioactive waste. We need to ensure we take time to complete a thorough and comprehensive review, to determine if the case is robust and demonstrates adequately the safety of future disposals.

### 3.10 Gaining confidence in the operator's Environmental Safety Case

It is incumbent upon LLW Repository Ltd to provide an Environmental Safety Case (ESC) that we are able to fully understand, interrogate and review in depth without having to repeat work ourselves. We have reviewed the assessment thoroughly and comprehensively using experts in the field. We have checked logic, approach, data, assumptions, models and calculations amongst other areas of the work. We have asked LLW Repository Ltd to repeat work where we considered it necessary and we chose to audit some important areas of the work in depth. Additionally, where we felt the ESC was not clear, failed to fully address a requirement in our Guidance on Requirements for Authorisation (GRA) (5), or required further supporting evidence, we sought this further information through 'Issue Resolution Forms'. We raised a total of 72 of these forms which sought further evidence from LLW Repository Ltd. LLW Repository Ltd have since responded to these further information requests and we have assessed these responses alongside the ESC. The forms, the ESC and our review of the ESC will be key supporting documents made available we consult upon our draft decision.

As well as the final review, we have worked with LLW Repository Ltd over the last 5 to 6 years to understand their approach to developing and demonstrating the ESC. We have also reviewed a number of interim submissions. These have given us an understanding of the approach being adopted. We have also worked with the site operators to ensure they have established a skilled team, capable of producing an acceptable ESC. Additionally, as a matter of good practice, LLW Repository Ltd have established an independent peer review group and international peer review group to review and comment upon their

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work. The independent peer review group has worked closely with LLW Repository Ltd over the last 5 years, reviewing important documents. The international peer review group was used on a one off basis to gain confidence in the approach being adopted towards development of the ESC.

We have also learned lessons from our review of ESCs produced in support of the landfills we have permitted for radioactive waste disposal, ensuring that best practice and learning is shared.

### **3.11 Significant changes to the 2011 Environmental Safety Case compared to the previous submission in 2002**

Our review of the 2002 Environmental Safety Case (ESC) concluded that the assessment provided a broad indication of the impact of the repository. However, it failed to make an adequate or robust argument for continued disposals of Low Level Waste because:

Estimates of doses and risks from existing disposals to members of the public in the future significantly exceeded regulatory targets without a clear plan for the optimisation of risk management;

It was indicated that the Low Level Waste Repository was likely to be destroyed by coastal erosion within hundreds to thousands of years with little assessment of the impacts; and

The case included insufficient consideration of optimisation and risk management to demonstrate that impacts will be as low as reasonably achievable (ALARA).

In reviewing the 2011 ESC we have looked to ensure the above issues have been adequately addressed and that the updated assessments are realistic, correct and use justified and underpinned data and assumptions. We concluded that the 2011 ESC and responses to further information requests received during our review of the ESC have addressed these issues.

### **3.12 Understanding of disposals made to the Low Level Waste Repository during the early days of operation**

There is a degree of uncertainty about the radioactive waste disposed of at the Low Level Waste Repository during the earlier years of operation. Today the consignments of radioactive waste are supported by much improved characterisation and monitoring techniques, along with requirements for more information (e.g. photographs of the waste). We have required that LLW Repository Ltd commit significant efforts to better understand the historic inventory, via paper trails, characterisation of waste and gathering anecdotal evidence from past employees. For the purposes of this assessment we require LLW Repository Ltd to take into account uncertainties within the inventory, like we do in other areas of assessment. The assessment must make suitably pessimistic assumptions. Where risks are highest we will expect a greater degree of assessment with regards to uncertainty. We will not permit continued disposals unless we are satisfied uncertainty in the disposal inventory has been adequately addressed.

### **3.13 The volumetric and radiological capacity of the site**

The capacity of the site will be determined by the outcome of the Environmental Safety Case (ESC) and our review of it. Radiological capacity will be limited by the amount, types and concentration of radioactive material the site can accept and for which it can continue to demonstrate safety both now and in the future under all reasonable scenarios. Volumetric capacity will in part be limited by the outcome of the ESC. It will also be limited by the physical capacity of the site - its boundaries, the depth of the water table and the acceptable height of disposals, which will be subject to planning permission. It will also be limited by other non-radiological characteristics of the waste which may challenge the performance of the repository (e.g. lead content). Following our review and consultation, if we permit further disposals, we may choose to limit disposals either radiologically or volumetrically so as to ensure safety. We may also choose to limit or add conditions to control other physical, chemical or biological characteristics of the waste that also have a bearing on the safety and performance of the repository.

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## 4. The Future of the Site

### 4.1 Possible outcomes of the Environmental Safety Case review

Following review of the Environmental Safety Case (ESC) we may find the submission acceptable, or not acceptable, against our guidance. We will publish the findings from our review of the ESC in 2014 prior to a public consultation on our draft decision regarding the permit variation application made by LLW Repository Ltd, in which they apply for future waste disposal at the site. We cannot reach a final decision until we have completed our review and taken into account all consultation comments received. At that point we may either refuse the application, or vary the permit.

If we refuse the application made by LLW Repository Ltd they will have a right to appeal and may re-apply. However, failure to permit the site may imply a significant shortfall in the ability to make an ESC for the site. Clearly such a decision will have significant implications for the LLWR and also for the availability of Low Level Waste (LLW) disposal routes within the UK. This may have implications for other programmes such as decommissioning at nuclear sites as well as the wider nuclear and non-nuclear industry. Throughout this process we will need to maintain close contact with the Nuclear Decommissioning Authority (NDA) as owners of the site and much of the UK's radioactive waste liability. Other disposal options would need to be sought, with potentially large time delays and costs associated with this. This risk is recognised by NDA and LLW Repository Ltd who have completed preliminary work to establish alternative options.

If we are able to permit further disposals at the site, we will issue a revised permit containing new limits and conditions. The limits and conditions applied will be dependent upon the case made and the acceptability of it, having taken into account all other factors including relevant consultation comments. A varied permit allowing continued disposals could range from allowing disposal of much of the UK's inventory of LLW and some other radioactive wastes, through to limited disposals by vault, waste type or quantities of radioactivity in certain groupings. We may impose certain improvement requirements to ensure any minor shortfalls or necessary improvements are addressed in a timely manner. We will also continue to review the permit on a periodic basis. We will regulate any permit we issue through inspection of the site.

### 4.2 Requirements for another site like the Low Level Waste Repository

The currently permitted capacity at the Low Level Waste Repository (LLWR) is full, although further capacity is available for storage only and there is also land available at the LLWR which may be suitable for further disposal of radioactive waste. Our review of the Environmental Safety Case (ESC) and subsequent consultation on the application from LLW Repository Ltd to dispose of further radioactive waste will allow us to decide whether we can permit further disposals or not. If the site is not permitted to dispose of further waste another site or sites would be required to manage radioactive wastes from UK nuclear and non-nuclear sites. At this stage it is impossible to say what form such sites could take. If further disposals to the LLWR are permitted, the need for further new sites will depend upon the site's capacity to take more waste, as demonstrated within the ESC. The need for further sites will also depend upon the effectiveness of efforts being driven by the UK Nuclear LLW Strategy (as well as other radioactive waste strategies) to minimise waste disposals and develop more appropriate, alternative disposal routes for less radioactive wastes. However, the LLWR could potentially provide capacity for several decades, meaning that alternative sites may not need to be sought for many years.

### 4.3 Monitoring of the site after closure and long term safety

As part of the permitting process, we will require the operators to monitor the site for a period after disposals to the site have ended and the site has been capped. This is to ensure that the site is continuing to perform as predicted. Decisions on the length of time that monitoring needs to continue will be based on the content of the radiological impact assessment within the Environmental Safety Case and on the

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ongoing monitoring results. This continued monitoring will be a legal requirement; we will only revoke the permit that requires this once we are satisfied that monitoring need not continue.

## 4.4 Making the waste safe and responsibilities after site closure

The details of how the site is eventually closed and made safe are subject to the Environmental Safety Case and final design details. However, based upon current understanding it is anticipated that the trenches and vaults will be capped using robust materials to minimise water ingress, erosion and human intrusion. A cut-off wall will also be constructed around the waste down to several meters depth to prevent water ingress from the sides and to ensure the local surface environment is not contaminated by the waste. As well as these major physical controls, management control will be maintained for a significant period (for example 100 years after last disposals), which may include maintaining security and limiting access to the site, continued leachate management and continued monitoring of discharges and the surrounding environment. We will only revoke the site's permit once we are satisfied the site is safe. This decision will be influenced by future use of the land and who will own or maintain it. At the point the permit is revoked, the Site Licence Company no longer has any responsibility for the site or maintenance of records associated with it. As the site is currently owned by the Nuclear Decommissioning Authority (a government body), we anticipate responsibility for the site passing to, or being controlled by, a government body or the local council.

## 5. Location of Disposals

### 5.1 Options for disposal of wastes at the generating site

The UK Low Level Waste Policy recognises the option to dispose of Low Level Waste (LLW) on or adjacent to existing nuclear sites, however it does not mandate this. The policy also recognises the Low Level Waste Repository as a national facility, suitable for the disposal of much of the UK LLW (subject to an approved Environmental Safety Case), and the range of alternative options that may be used (including landfill disposal). Operators may apply to dispose of waste at any site and we would assess any such applications for disposal on their merits. It should be noted that not all sites where waste is generated may be suitable for waste disposal and the organisations that produce the waste may not have the suitable skills and capabilities necessary to perform safe disposal activities.

### 5.2 The suitability of the Low Level Waste Repository location for the disposal of waste

The location of the Low Level Waste Repository (LLWR) presents a number of aspects requiring careful consideration, such as geology, proximity to the coast, water table and local weather conditions. However, it is for the operator to demonstrate that they can meet all the environmental safety criteria we set for disposal sites, taking all relevant factors into account. Any other disposal location would have to meet the same criteria. Existing sites need to operate in line with our high expectations, along with our requirements and guidance which are periodically reviewed and updated to reflect current best practice. We will not permit further disposals at the LLWR or any other new site unless we are convinced it is safe to do so and our requirements are met. Other possible new sites may also present their own risks, for example sensitive surface waters or groundwaters which may be used now or in the future as sources of drinking water.

### 5.3 Suitability of the current Low Level Waste Repository site for a new facility if a choice were being made now

The proximity of the site to the coast and the potential for coastal erosion of the facility at some point in the future runs counter to the basic idea of disposing of radioactive waste by putting it in a place where it is unlikely to be disturbed. In addition, it undesirably complicates the Environmental Safety Case (ESC) that must be made to support any disposals at such a site. The ESC is further complicated by other factors

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associated with the site such as the complex geology and hydrogeology in the area and proximity to a Special Area of Conservation and Site of Special Scientific Interest. These points provide the fundamental reason why 'it is doubtful whether the location of the LLWR site would be chosen for a new facility for near-surface radioactive waste disposal if the choice were being made now' and in addition why it would not be in accordance with current national and international siting practice for new facilities.

However, providing a satisfactory environmental safety case can be established in accordance with our guidance and UK Low Level Waste Policy (1) and providing the facility can continue to be operated safely, there is no fundamental reason why disposals at this existing facility cannot continue.

## 5.4 Reason for the initial development of the Low Level Waste Repository at Drigg

Trench disposals commenced in July 1959, starting in one of the former Royal Ordnance Factory railway cuttings re-engineered for the purpose. At the time the site was considered to have available land within reasonable proximity to the Windscale site where the majority of UK low level waste was being generated.

## 5.5 Suitability of the Low Level Waste Repository site for waste disposal given the expectation of coastal erosion at the site at some point in the future

The location of the Low Level Waste Repository (LLWR) presents a number of challenges, such as proximity to the coast. However, it is for the operator to demonstrate that they can meet all the environmental safety criteria we set for disposal sites, taking all relevant factors into account. Any other disposal location would have to meet the same criteria. Existing sites need to operate in line with our high expectations, along with our requirements and guidance which are periodically reviewed and updated to reflect current best practice. We will not permit further disposals at the LLWR or any other new site unless we are convinced it is safe to do so and our requirements are met. Other possible new sites may also present their own risks, for example sensitive surface waters or groundwaters which may be used now or in the future as sources of drinking water.

## 5.6 Application of the 'proximity principle'

The proximity principle seeks to avoid excessive and unnecessary transportation of materials for disposal. The UK Low Level Waste Policy (1) explicitly states that consigning sites must take the proximity principle into account when they make waste management decisions. The policy also states that the proximity principle needs to be weighed against other factors (e.g. other available options, cost, level of protection offered) when considering options. This will inevitably mean that sometimes the preferred disposal option may not be the nearest to the site of origin of the waste.

The Low Level Waste Repository (LLWR) is currently the only national facility capable of taking a full range of Low Level Waste (LLW) and is recognised within the UK Low Level Waste Policy as having a national role. If more sites in the UK are permitted for the disposal of LLW this will, in part, help to increase the options to improve application of the proximity principle but will still not resolve the lack of alternative options for the disposal of the LLW that requires the level of protection that currently only the LLWR can provide.

## 5.7 Other Low Level Waste disposal capacity in the UK

The UK Low Level Waste Policy (1) allows for radioactive waste disposal to landfills, on or adjacent to existing nuclear sites, or elsewhere. Under this policy operators may choose to make applications for disposal, which we must consider on their own merits. To date 3 landfills have been permitted in England to allow disposal of some low level wastes. In addition there is a landfill in Scotland with a permit to receive Naturally Occurring Radioactive Material (NORM) wastes which occur from processes such as those

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undertaken in the oil and gas industry. There are also three incinerators in England which are permitted to dispose of some low level waste. Radioactive waste which is exempt from the regulations due to its low activity has always had a disposal route to landfill.

The Low Level Waste Repository (LLWR) has a significant potential disposal capacity remaining, however the ability to make further disposals is subject to an acceptable Environmental Safety Case. Even if further disposals are permitted, the LLWR is not expected to have sufficient capacity to take all of the UK's Low Level Waste (LLW) and alternative disposal sites are expected to be required. Furthermore, the LLWR is a highly engineered facility, designed to accept the full range of LLW including the highest levels of radioactivity in this category, along with some of the waste that are above LLW limits, provided each consignment is on average within LLW limits. This level of containment is not required for lower activity LLW, which may be safely disposed of in other near surface burial sites, such as conventional landfills, subject to an appropriate environmental safety case being made.

## 6. Protection of People and the Environment

### 6.1 Potential impacts on the health of people living near the site and the environment

Radioactive wastes are, by their definition, radioactive and may also contain non-radioactive hazardous characteristics. For these reasons they do pose a hazard if not handled correctly. However, if handled correctly, the disposal of radioactive wastes will not affect the health of people living near the site. We will not permit the site for disposal of radioactive waste unless we are satisfied that the wastes proposed for disposal and the means of managing the waste are safe both now and in the long term. Any application for disposal must be accompanied by a radiological and non-radiological impact assessment that considers risks to the most exposed members of the public and to the environment. Our principal responsibility is always to protect people and the environment. We will ensure that waste disposal is safe for people and not harmful to the environment.

### 6.2 Demonstration of safety in the short term

We are satisfied that the Environmental Safety Case (ESC) produced in 2002 demonstrated that the site is safe to operate now whilst under regulatory control. We have no reason to believe that this will not continue to be the case. The updated ESC received in May 2011 demonstrates continued safety in the short term and we are reviewing it carefully to assess whether it supports continued disposals in the longer term. Having reviewed the ESC we will take any necessary action if we consider current operations do not continue to be safe for people and the environment.

### 6.3 Impact on house values in the area

We see no reason why the current proposals should impact upon house values, particularly given that the site has safely operated as a radioactive waste disposal site since 1959. If a new permit for continued disposal is granted, it will be based on acceptable and safe impacts to local people and to the environment. We believe there would be no reason for concern on grounds of health or environmental impact. We have no evidence that any radioactive waste disposals permitted by us have had an impact on house prices.

### 6.4 Risks from contamination of the food chain

The applicant has provided us with a radiological and non-radiological impact assessment detailing the risks of exposure, including those through food pathways. We would only permit disposals if we were satisfied that any such exposures were within acceptable limits.

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## 6.5 Potential impacts on local sites designated for their nature conservation value

The applicant has provided us with a radiological and non-radiological impact assessment detailing the risks of exposure to protected species which may occupy designated sites in the area, for example the adjoining (Drigg Coast) Site of Special Scientific Interest and Special Area of Conservation. The applicant will also need to satisfy us that any impacts arising from the site will not cause harm to designated sites in the area. We will consult Natural England on our assessment.

## 6.6 Potential for increased traffic and disruption (noise, odour, vermin, and litter)

Traffic is primarily a matter for the planning authority to consider. However, if the site is permitted for further disposals, there is no reason to believe that the rate of waste disposal would increase significantly above that today. In general the quantities of waste disposed are small compared to conventional landfill of waste. Some waste is currently transported to the site by rail and we would encourage continued and increased use of rail, although it is for the consignor and the operator to agree the most appropriate means of transport.

We do not anticipate odour being an issue for the Low Level Waste Repository, as radioactive wastes generally contain very few organic waste components which are often the source of smells that are associated with domestic landfills. For the same reason we do not anticipate vermin being an issue, as the radioactive waste is of low organic (edible) content, is well contained within metal containers and soon after arrival is grouted (historic waste is well buried).

We see no reason why noise should increase above current levels during times of routine operation at the site. Traffic and noise disruption could increase during major construction activities (e.g. vault construction or capping). Control measures will need to be agreed with the relevant planning authority.

## 6.7 Assessment of non-radiological impacts from the waste

In addition to a radiological assessment, the applicant has provided us with an impact assessment for the non-radiological contents of the waste (e.g. metals such as cadmium, or substances such as asbestos). This assessment must demonstrate that the same level of protection is provided to the environment from the non-radiological contents of the waste, as if that waste were not radioactive, i.e. the site must meet the performance standards consistent with a conventional landfill. As with the radioactive contents of the waste, if handled correctly the disposals will not affect the health of people living near the site or the environment. Our principal responsibility is always to protect the environment. We will ensure that waste disposal is safe for people and not harmful to the environment.

## 6.8 Risk based disposal and deeper geological disposal

The disposal of radioactive waste is based on risk (5). This means that controls take account of any hazard presented by the waste. Most Low Level Waste (LLW) can be safely disposed of in near-surface facilities. Some LLW can be safely disposed of to landfill, however some LLW requires a greater degree of engineered disposal, such as grouting and disposal in vaults at the Low Level Waste Repository. Whichever method is used to dispose of the radioactive waste, it must be informed by assessment of potential radiation exposure and its associated risks. Exposure should be consistent with risk targets and all dose constraints should be met. Such assessments will inform the type of disposal options that are suitable. Government policy is for a deep Geological Disposal Facility (GDF) to be developed to dispose of waste with higher levels of radioactivity – that is, higher hazard wastes.

## 6.9 Addressing rising sea level and coastal erosion within our review

We consider the potential for coastal erosion to be a key issue for the site and LLW Repository Ltd has addressed it within the Environmental Safety Case (ESC). We will review any assessment carefully and only permit further disposals if, even under these scenarios, impacts are demonstrated to be acceptable against our guidance (5) and UK Low Level Waste Policy (1). Our review of the ESC will inform any draft decision on a permit variation to allow future disposals at the site. We will consult on this in 2014 and will have published the findings of our review of the ESC prior to this.

## 6.10 Understanding of the impacts of radioactive waste and radiation

The longer term impacts of radiation exposure are well understood, primarily through large scale studies of groups exposed to radiation such as miners, radiation workers and Japanese atomic bomb survivors. This understanding continues to improve as further work is carried out. This evidence is used by the International Commission on Radiological Protection (ICRP) and its recommendations form the basis of radiological protection principles and legislation throughout the world. These ICRP recommendations are reviewed by Public Health England as the relevant UK competent national authority. This advice is taken into account in new or revised legislation, national policy, and government guidance. This translates to dose criteria against which we compare to determine safety.

The radiological impact assessment within the Environmental Safety Case does not attempt to predict precisely how the site might evolve after closure. For example the timing and nature of activities in the long term that might disrupt the site. Instead the impact assessment considers a range of scenarios and builds in conservative assumptions into each to address the potential radiation doses. Through this approach the more restrictive scenarios have been identified, and used to derive an upper limit on the quantities of waste that can be disposed of.

## 6.11 Radiation doses from disposals

It is for LLW Repository Ltd to present an Environmental Safety Case (ESC) detailing the expected radiation doses arising from disposals. We have been reviewing the ESC to determine whether we accept the evidence presented and whether we believe this demonstrates continued disposals will be safe to people and the environment.

Dose constraints and risk/dose guidance levels which must be addressed within the ESC are specified in the UK Low Level Waste Policy (1) and our Guidance on Requirements for Authorisation (GRA) (5).

## 6.12 Potential for terrorists to use any of the materials for their purposes

The specific activity of these wastes (the quantity of radioactive material in any given volume) is generally so low that it would be of no use to terrorists. Any higher specific activity materials are well mixed with other waste and grouted in place within metal ISO containers, making the waste difficult to access. The site has security controls in place such as fencing and security staff. Security of the site is regulated by the Office for Nuclear Regulation (ONR).

## 6.13 Discharges from the site whilst operational

During operations we only limit solid waste disposal through our permit. However, gaseous, aqueous and solid wastes are generated from the burial and associated processing of the waste. We do not place numeric limits on those discharges but do require the Best Available Techniques (BAT) to be used in all aspects of operation at the site. In addition we do require these discharges to be monitored and relevant data reported to us on a periodic basis.

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Gaseous wastes are generated by the gradual decomposition and radioactive decay of the disposed wastes, as well as its handling. Quantities of gaseous wastes released are small and present a very low risk during operations. Aqueous wastes are generated through leachate coming out of the waste mass, surface run-off, as well as from other waste handling activities. The radioactivity associated with leachate is sampled for monitoring before the leachate is discharged to sea via a pipeline. The risk presented by aqueous waste discharge is again small. Solid wastes are generated on the site through various operational and decommissioning activities. These volumes are small compared to the rest of the nuclear industry and are managed as any other radioactive waste.

## 6.14 Potential impacts on groundwater, drinking waters and aquifers

The Environmental Safety Case addresses each of these issues as part of the radiological and non-radiological assessment. LLW Repository Ltd must assess how pollutants may escape from the waste and enter groundwater, potentially impacting upon aquifers and drinking water. We will only permit the site if these assessments demonstrate to our satisfaction that all the relevant safety criteria are met now and into the future. For example, if anyone in future was to dig a well or borehole then we must be sure that any doses resulting from drinking the water from it are acceptable. Although the site does sit on an aquifer, it is not anticipated that it would be used for large scale water supplies due to the proximity to the sea.

## 6.15 Potential for flooding at the site, now or as a result of climate change

Currently the site is susceptible to some surface water accumulation and there is a small risk of flooding to the south of the site, a significant distance from any waste disposals. This does not currently cause any significant operational difficulties. It is hard to predict how this situation may change as a result of climate change, but we asked that LLW Repository Ltd assess this and the uncertainties around the issue. Work undertaken by LLW Repository Ltd indicates that in the future there may be increased risk of flooding to some areas of the site, particularly the south. Ultimately, as a result of climate change, coastal erosion is expected to advance, eventually leading to erosion and inundation of the site within several hundred to a few thousand years time. As part of the Environmental Safety Case (ESC) LLW Repository Ltd has considered the risks of flooding and climate change and makes a claim to demonstrate that even under reasonably pessimistic scenarios of climate change, impacts remain acceptable against our guidance and government Policy. We will review this as part of our review of the ESC and will publish our response prior to our consultation on the draft decision on the permit variation for the site.

## 6.16 Potential impacts on Scotland, Wales, Ireland and the Isle of Man

As part of the Environmental Safety Case (ESC) we expect LLW Repository Ltd to have considered high risk groups when assessing the acceptability of disposals. For example local residents eating local produce and fish, individuals farming on the final waste cap or users of the beach whilst waste may be eroding in the future. Impacts must be considered that might arise from aerial releases, water, or intrusion into the waste itself. The ESC must demonstrate that the impacts upon these groups are acceptable against our guidance and government Policy. Any impacts upon neighbouring countries will be far smaller due to the significant distances involved and the dilution of any releases that occur in the air or sea. However, under Article 37 of the Euratom Treaty the UK Government must outline the plans for future disposals to the European Commission, who then consider these through an expert panel to determine whether there will be any negative impacts on other member states (arising from planned disposals or a significant accident at the site). Until a positive opinion allowing the plans to go ahead is received, LLW Repository Ltd will not be able to dispose of waste into future vaults.

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## 6.17 Consideration of natural disasters within the Environmental Safety Case

As a near surface site the Low Level Waste Repository is potentially vulnerable to a range of natural or man-made disasters such as earthquakes, fire, glaciation, or human intrusion. We expect the Environmental Safety Case (ESC) to have considered any such events within reason, taking into account the associated uncertainties around the likelihood of the events occurring and the impacts if they do. The ESC must provide robust and reasoned arguments to justify the safety of the site under such eventualities, even if they are highly unlikely to occur.

## 6.18 Protection of wastes historically disposed of into the trenches

The site is required to carry out an extensive programme of monitoring of any discharges due to its current or historical operations. We also require them through their permit to ensure that their operations are carried out by applying the best available techniques. This leads to them carrying out investigations into the performance of features such as the interim engineered cap placed over the historic trench disposals. Following an assessment of the condition and long-term performance of the existing interim trench cap, it was determined that LLW Repository Ltd would undertake a number of improvements to the trench cap.

The cap's main function is to prevent water penetration into the wastes. A number of repairs have been completed during 2013 and 2014. Whilst undertaking these improvements, further damage to some areas of the trench cap membrane was identified and further investigations were instigated to determine the extent of this damage. These investigations have now been completed and have found a number of areas where the membrane is damaged. LLW Repository Ltd is completing an assessment of the necessary measures to address this damage (a best available technique (BAT) assessment). We will require LLW Repository Ltd to carry out any necessary further work to ensure the protection provided by the trench cap continues to represent BAT. This investigation and remedial improvement work is an example of how the permit requirements drive continued assessment of the facility and that where improvements can be made, they are undertaken where this is justified.

## 7. Our Role and Responsibilities

We are responsible for regulating sites that wish to dispose of radioactive waste, such as the Low Level Waste Repository. Such sites must hold a permit under the Environmental Permitting (England and Wales) Regulations 2010. Through these permits we oversee how each site disposes of its radioactive waste, including discharges to air and water, and also burial of solid waste. Our main role is to inspect sites to make sure that they are working within the law. We also work with site managers and staff to help them achieve the highest standards of environmental protection. We work closely with the Office for Nuclear Regulation (ONR), which regulates all aspects of nuclear and occupational safety at these sites and the on site management of radioactive waste. Some of our specific duties include:

Assessing applications for new, or variations to existing, permits;

Reviewing nuclear site permits to make sure they are still appropriate and setting appropriate limits and conditions;

Inspecting sites, equipment, plants and arrangements;

Investigating incidents and accidents and taking enforcement action if necessary;

Informing the public about the regulatory process and seeking views from people;

Providing advice on waste disposal facilities and application of Best Available Techniques (BAT) to minimise waste; and

Working with operators and the Environment Agency's monitoring team to monitor the radiological impact of site operations on the environment.

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The Environmental Safety Case (ESC) is a key document which demonstrates the environmental safety of disposals. We have been reviewing the ESC and will use this review as a basis for any permit decision, along with our consultation process. We have been reviewing the ESC within the scope of Government policy and against our guidance, the GRA (5). The review of the ESC and any subsequent application for disposal will be made against technical criteria, taking into account all the information available to us from the application, knowledge and experience of the site and consultation comments received. Any permit we issue will contain appropriate limits and conditions to ensure the site remains safe. Any permit will specify monitoring we require to ensure the site continues to operate safely and as expected. We will also specify requirements for record keeping.

## 8. Others Involved

### 8.1 Cumbria County Council

Cumbria County Council is the relevant Planning Authority for planning permission to construct vaults, to implement closure engineering and for disposal at the Low Level Waste Repository. Cumbria County Council consider such planning applications, consult upon them and determine whether to grant or refuse permissions, along with any planning conditions. We work closely with Cumbria County Council to understand interactions between our regulatory regimes.

### 8.2 Public Health England

The statutory duty to monitor the health of the local population lies with the County Council Health and Care Services, who often ask Public Health England (PHE) for advice. PHE also act as advisers on radiation dose issues to Government, acting as the relevant UK competent national authority to, for example, review International Commission on Radiological Protection (ICRP) recommendations on radiological protection principles.

### 8.3 Office for Nuclear Regulation

The Office for Nuclear Regulation (ONR) is responsible for regulating all aspects of nuclear and occupational safety at nuclear sites and the on-site management of radioactive waste. We work closely with the ONR in regulating nuclear sites. As part of the regulation of nuclear sites ONR require the operator to produce safety cases to demonstrate the ongoing safety of operations. These 'safety cases' are distinct from the 'Environmental Safety Case' (ESC) in that they focus on issues of safety resulting from operations rather than wider impacts to the environment and general public resulting from permitted disposals. The ONR now also incorporates the regulation of radioactive materials transport and civil nuclear security. This includes regulation of the safety and containment of such transports.

### 8.4 Nuclear Decommissioning Authority

The Nuclear Decommissioning Authority (NDA) is a non-departmental public body created through the Energy Act 2004. It owns 19 nuclear sites and the associated civil nuclear liabilities, including the Low Level Waste Repository and much of the UK's radioactive waste inventory. NDA is responsible for decommissioning and clean up of these nuclear facilities, ensuring safe management of waste, implementing Government Policy on nuclear waste and developing strategies and plans.

### 8.5 The Environment Agency's consultation on the LLWR and the Department of Energy and Climate Change consultation on a revised site selection process for a Geological Disposal Facility

LLW Repository Ltd operates the national Low Level radioactive Waste Repository (LLWR) near Drigg. In May 2011, LLW Repository Ltd, submitted an updated Environmental Safety Case (ESC) to the

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Environment Agency, as required under their current permit. The Environment Agency has completed its technical review of the ESC and, informed by that review, LLW Repository Ltd applied to the Environment Agency on 28 October 2013 to vary its current environmental permit to allow continued disposal of low level radioactive waste (LLW) at the site. The Environment Agency's due process is to seek views on the application through a consultation exercise, to inform their determination. Following this initial consultation, we will publish the findings of our ESC review prior to a second period of consultation during which we will present both our findings and our draft decision on the permit application. The Environment Agency will only permit further disposals of LLW if it is satisfied that it will be safe for people and the environment, both now and in the longer term. DECC welcomes the application, which should provide certainty over the future availability of LLW disposal routes which are essential to supporting the decommissioning and clean-up of the current nuclear legacy in the UK.

The DECC consultation seeking views on a revised site selection process for a Geological Disposal Facility (GDF) in England and Wales has now finished. Later in the year, the government will set out its formal response to the evidence submitted to the consultation. Informed by this, the government also aims to publish a White Paper, setting out a revised siting process for a GDF. GDF will be for Higher Active Waste (HAW) and nuclear material that is unsuitable for disposal to the LLWR.

The two consultation processes described in this section are not linked. Information about the Environment Agency's determination of the LLW Repository Ltd application is available at <https://www.gov.uk/government/collections/low-level-waste-repository>.

## 9. Other Nuclear Sites and Issues

### 9.1 Relationship between the Low Level Waste Repository and new nuclear power station build

There is no explicit relationship between new nuclear power station build and the Low Level Waste Repository (LLWR). Although new nuclear power stations are expected to generate less radioactive waste than older ones, they will still generate radioactive waste during operations and also when decommissioned which will require management and ultimately disposal. As the national UK repository the LLWR would be available for these sites to use if required (assuming their waste is suitable for disposal at the site). If the LLWR is not available, then alternative disposal facilities would be required.

### 9.2 Types and quantities of radioactive wastes that may be generated by new nuclear build

New nuclear power stations, if built, will generate a range of types of radioactive wastes including some which are likely to be suitable for disposal within the Low Level Waste Repository (LLWR) as well as other suitable disposal routes (e.g. landfill). This is recognised within the UK Nuclear LLW Strategy (3) and also within the Environmental Safety Case that has been submitted by LLW Repository Ltd for the LLWR. We are working closely with the developers and operators, along with the Office for Nuclear Regulation, to ensure that all waste generation through construction, operations and eventually decommissioning is minimised. We expect the developers to apply Best Available Techniques (BAT) to ensure this is the case and to make best use of alternative options for waste treatment and disposal.

### 9.3 Other Low Level Waste disposal sites in the UK

The Low Level Waste Repository currently provides the largest UK capacity for radioactive waste disposal and handles the broadest range of LLW, including some of waste above the LLW category. However, other LLW disposal sites are operational.

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Landfills permitted for the disposal of radioactive waste include Clifton Marsh near Preston in Lancashire, Lillyhall landfill in Cumbria, and the East Northants Resource Management Facility in Northamptonshire. Other landfills take small volumes of Low Volume Very Low Level Waste (LV-VLLW) and LLW as exempt radioactive waste, mostly from non-nuclear sites such as research and development organisations and hospitals. Sellafield Ltd also operates a landfill at Sellafield, known as CLESA, which takes low activity LLW from the site.

In Scotland a LLW repository has been built at Dounreay to take waste from the Dounreay nuclear site. This is regulated by the Scottish Environment Protection Agency (SEPA). A permit has also been issued by SEPA for a site at Stoneyhill to take Naturally Occurring Radioactive Material (NORM) waste.

The other mechanism for disposal of radioactive waste is incineration. Three commercial sites are permitted for disposal of radioactive waste by incineration – at Ellesmere Port, Cheshire, in Slough Berkshire and near Fawley, Southampton.

## 9.4 Comparable international sites

The disposal system used at the Low Level Waste Repository is similar to many other radioactive waste disposal sites taking similar wastes around the world. For example, sites in France, Spain and the USA all use near surface disposal facilities for similar waste types, using similar disposal methods involving disposal of contained waste within vaults. Direct comparison between practices in different countries is however complicated by differing natures of waste generated and waste categorisations used within those countries. Near surface disposal is also recognised as a common and standard practice for low and intermediate level radioactive wastes by the International Atomic Energy Agency (IAEA), who develop and provide guidance to developers in this area.

# 10. Policy, Regulation and Permissions to Operate the Site

## 10.1 Planning permission

Planning permission will be required for the disposal of waste into the most recently constructed vault which is called Vault 9, higher stacking of containers in Vault 8, construction and disposal into any subsequent vaults and also for the closure engineering (e.g. final cap) associated with the site. The relevant Planning Authority is Cumbria County Council. We work closely with Cumbria County Council to understand planning requirements and interactions with our site regulation and permitting.

## 10.2 UK low level waste policy

Operation of the Low Level Waste Repository (LLWR) is consistent with government policy as long as all appropriate criteria have been met in justifying its ongoing use. Near surface disposal of radioactive waste is recognised as an appropriate disposal option. The LLWR is acknowledged as a centralised national facility for the disposal of much of the UK's LLW. However, it is also accepted that to continue operations LLW Repository Ltd must demonstrate continued safety of the site. Government policy also requires the Nuclear Decommissioning Authority (NDA) to develop and publish a plan for the optimal use of the LLWR, taking into account our regulatory review and uncertainty over future capacity.

## 10.3 Policy in Scotland

UK government policy on Low Level Waste management also applies in Scotland. The Scottish Environment Protection Agency (SEPA) regulates radioactive waste disposals in Scotland.

## 10.4 Policy in Wales

UK government policy on Low Level Waste also applies in Wales. In 2013 the Environment Agency's remit in Wales moved to a new body called Natural Resources Wales, along with many of the Environment

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Agency staff living and working in Wales. The same regulations which apply in England for radioactive waste management apply in Wales (subject to any changes that the Welsh Government may wish to introduce).

## 10.5 Other permissions required to operate the site

In addition to permitting radioactive waste disposal under the Environmental Permitting (England and Wales) Regulations 2010 (EPR10), the Low Level Waste Repository (LLWR) requires other permissions and licences to operate. Key amongst these are a Nuclear Site Licence from the Office for Nuclear Regulation and Planning Permission from Cumbria County Council. The Environment Agency is also responsible for permitting non-radiological water discharges under EPR10. Other permissions may be required from us from time to time, for example during construction works, to regulate water discharges, or works around surface water bodies. Other permissions may also be required on the site, for example to move certain protected species (e.g. great crested newts) that occupy the site during construction works.

A further permission required is under Article 37 of the Euratom Treaty. Under this Treaty a submission must be made by the UK government, to the European Commission (EC), to seek their opinion on a site's operations in relation to how they may impact upon member states. As the LLWR was already operational when this Article came into effect, no submission was required at the time. However, certain changes to operations and permitting now require a submission to be made. An Article 37 submission is therefore being prepared and will be made for the LLWR with information supplied by the operator to the Department of Energy and Climate Change (DECC). Once a submission is made to the EC by DECC, a decision is generally provided within six months, dependent on the need to seek any clarification. A positive decision from the EC is needed before we would permit further disposals at the LLWR.

## 11. References

1. Policy for the long term management of solid radioactive waste in the United Kingdom, Defra, DTI and the Devolved Administrations, March 2007.
2. One Becquerel (Bq) is the International (SI) Unit for the number of nuclear disintegrations occurring per unit time in a quantity of radioactive material. 1 Bq is one radioactive disintegration per second. This is an extremely small unit and so levels of activity expressed in Bq are often prefixed such as gigabecquerel (GBq) =  $1 \times 10^9$  Bq (or 1,000,000,000 Bq).
3. UK Strategy for the Management of Solid Low Level Radioactive Waste for the Nuclear Industry, Nuclear Decommissioning Authority, August 2010.
4. See: <http://www.nda.gov.uk/ukinventory/>
5. Near-surface Disposal Facilities on Land for Solid Radioactive Wastes. Guidance on Requirements for Authorisation. The environment agencies. February 2009.
6. Supplementary guidance related to the implementation of the Groundwater Directive, Near-surface Disposal Facilities on Land for Solid Radioactive Wastes. Guidance on Requirements for Authorisation. Environment Agency, July 2012.