Low Level Waste Repository

Frequently asked questions **May 2011**

Information about the Low Level Waste Repository (LLWR), how we regulate the site and our review of their Environmental Safety Case (ESC).

The Low Level Waste Repository

What is the Low Level Waste Repository?

The Low Level Waste Repository (LLWR) is a site near Drigg in West Cumbria used for the disposal of low level solid 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 LLW by burial. Until around 1990 wastes were disposed of in trenches 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.

How is waste managed at the Low Level Waste Repository?

The Low Level Waste Repository is a dedicated Low Level Waste (LLW) disposal site. 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 chemically condition it and to provide stability to the waste. It is then disposed of within highly engineered concrete vaults. The site operates it's own grouting facility and also manages the leachate and surface run-off generated by the site. 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 seal the disposed waste off 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).

Who owns and operates the Low Level Waste Repository?

The site is owned by the Nuclear Decommissioning Authority (NDA) on behalf of the Government. The site licence company who is permitted to dispose of waste and to operate a nuclear licenced site is LLW Repository Limited. Both the site licence company and the Low Level Waste Repository are managed on behalf of the NDA by UK Nuclear Waste Management Ltd (UKNWM Ltd). UKNWM Ltd is referred to as the Parent Body Organisation (PBO) of LLW Repository Ltd. UKNWM Ltd is a consortium led by URS, along with Studsvik UK, Areva and Serco Assurance. UKNWM Ltd has been the PBO for LLW Repository Ltd since 1st April 2008. The current contract between UKNWM Ltd and the NDA runs until 31st March 2013.

Low Level Waste

What is Low Level Waste?

Low Level Waste (LLW) is 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. A sub-category of LLW is Very Low Level Waste (VLLW). This can be low volume (LV-VLLW), mainly from hospitals and universities, that can be safely disposed of with municipal, commercial or industrial waste, and high volume (HV-VLLW), from nuclear sites, that can be disposed of to specified landfill facilities.

LLW is the lowest category of radioactive waste, but because it still contains some radioactive material it is not acceptable for disposal as ordinary refuse. 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 near Drigg.

There are two categories of radioactive waste that are more radioactive that LLW, these are Intermediate Level Waste (ILW) and High Level Waste (HLW). LLW is defined, in the UK Low Level Waste Policy[1], as: "radioactive waste having a radioactive content not exceeding four gigabecquerels per tonne (GBq/te) of alpha or 12 GBq/te of beta/gamma activity". Gigabecquerels being a measure of radioactivity[2].

Where does Low Level Waste come from?

Most of the UK's radioactive waste comes from the nuclear power industry, including the production of nuclear fuel, operating nuclear reactors, spent fuel reprocessing, research and development activities and decommissioning 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.

What is being done to avoid Low Level Waste generation and disposal?

The policy for the long term management of solid low level radioactive waste in the United Kingdom[1] (the UK Low Level Waste Policy) encourages the minimisation of the amount of waste requiring disposal and considers disposal as the option of last resort. This policy required the Nuclear Decommissioning Authority (NDA) to develop a UK Nuclear Low Level Waste Strategy[3], which was published in 2010. This strategy seeks the use of the waste management hierarchy within the nuclear industry, in that waste should be kept to a minimum, re-used or recycled. Where disposal is necessary,

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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) = 1×10^{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.

the strategy looks for disposal in appropriate facilities. For example use of landfill disposal of High Volume Very Low Level Waste that does not need the level of engineered containment provided by the Low Level Waste Repository. Following publication of the strategy, the NDA have lead on work to implement a wide range of initiatives to improve waste management across the industry. A similar strategy for the non-nuclear industry is being prepared.

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 also works with operators, providing advice and guidance to aid continual improvement in waste management.

How much radioactive waste is there is the UK?

Estimates of the volumes of Low Level Waste (LLW) that will need to be managed between now and around 2130 have been generated[4]. These estimate around 1.1 million m^3 of LLW and around 3.3 million m^3 of Very Low Level Waste will be produced. The Low Level Waste Repository is unlikely to be able to take all of this waste. However, if it is able to make a case for continued disposals it may be able to take a significant proportion of it and could remain operational for a number of decades. Capacity issues will also be eased if waste minimisation initiatives being implemented by the Nuclear Decommissioning Authority are successful and if new disposal facilities for lower activity waste (e.g. landfill disposal of High Volume Very Low Level Waste) are successful.

How is the waste coming to the site categorised and the contents checked?

The different rules applying to disposal of different waste types oblige operators to segregate wastes into discrete waste streams. This applies just as much to radioactive waste as to wastes deemed as "hazardous" under different legislation. Producers must have management and control arrangements in place to ensure that they meet their permit requirements. We will check, however, which may include ‘seizing’ wastes consigned for disposal, to confirm their composition, along with site inspections and audits. Additionally, we expect the disposal site to also apply appropriate checks on waste they receive to ensure it remains complaint with their disposal permit. These checks may include consignor audits, monitoring of received wastes or check monitoring of wastes during the disposal process.

Location of Disposals

Why not just keep the waste on the sites where it is generated and deal with it there?

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 LLW (subject to a satisfactory Environmental Safety Case). 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, possibly, not all sites where waste is generated may be suitable for waste disposal.

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4 See: http://www.nda.gov.uk/ukinventory/

The Low Level Waste Repository may be considered to be in a non-ideal location. Would it not therefore be appropriate to start disposing of waste elsewhere?

The Low Level Waste Repository (LLWR) has a number of challenges to address, 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.

Is the 'proximity principle' being followed in allowing waste to the Low Level Waste Repository from around the UK?

The proximity principle seeks to avoid excessive and unnecessary transportation of materials for disposal. The UK Low Level Waste Policy[5] on Low Level Waste (LLW) management 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 is currently the only national facility capable of taking a full range of 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.

Why are new disposal sites being considered when we have the Low Level Waste Repository?

The UK Low Level Waste Policy 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.

The Low Level Waste Repository (LLWR) has a significant potential disposal capacity remaining. However, the ability to dispose of further waste 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. This level of containment is not required for lower end LLW and High Volume Very Low Level Waste, which may be safely disposed of at less engineered near surface burial sites, such as conventional landfills.

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5 Policy for the long term management of solid radioactive waste in the United Kingdom, Defra, DTI and the Devolved Administrations, March 2007.

The Environmental Safety Case and Our Review

What is an Environmental Safety Case?

It is a legal requirement of the environmental permit held by the Low Level Waste Repository that the holder maintain an Environmental Safety Case (ESC). The ESC must demonstrate that members of 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 (e.g. geology), 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 uncertainly. The ESC must be consistent with the principles and requirements detailed in our Guidance on Requirements for Authorisation (GRA)[6]. 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 Low Level Waste Repository (LLWR) receives the full range of Low Level Waste (LLW) and is a large complex site, we anticipate the ESC to be several thousand pages long, supported by many references.

Why is a new Environmental Safety Case needed now?

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. We also required delivery of a number of improvement requirements, including an updated ESC by 01 May 2011. This updated ESC must demonstrate that continued disposals at the site are safe, now and into the future. Our review of this updated ESC will form the basis of our review of the current environmental permit and any decision on whether to allow continued disposals.

What are the process and timescales for review of the Environmental Safety Case and permitting of the site?

The Environmental Safety Case (ESC) is due for submission by 01 May 2011. The ESC will be placed on our public register shortly after receipt, although at that point we will not be actively seeking comments. We will review the ESC, seeking further information from the operators as necessary. Our review will be detailed and is expected to be complete by around autumn 2012 and published in 2013. Following completion of our review we anticipate the operators making an application to us under the Environmental Permitting Regulations 2010 to dispose of further waste at the Low Level Waste Repository. We will place this application on our public register and consult upon it. This is anticipated to be around mid to late 2012 into early 2013. Based upon the review of the ESC and the outcome of the application consultation we will prepare a draft decision and consult upon it around Spring 2013. Following consideration of all comments received we will publish our decision around summer 2013, along with any permit as appropriate. It should be noted that these timescales are approximate and subject to change dependent upon the size and quality of the ESC submitted, along with the time taken by the applicant to respond to any additional information requests.

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6 Near-surface Disposal Facilities on Land for Solid Radioactive Wastes. Guidance on Requirements for Authorisation. The environment agencies. February 2009.

To what guidance will the review of the Environmental Safety Case be undertaken? What type of review will it be?

The review of the Environmental Safety Case (ESC) will be undertaken in accordance with the joint environment agencies Guidance on Requirements for Authorisation (GRA)[7], published in 2009, along with draft supplementary guidance issued in 2010[8]. This guidance explains the requirements that we expect a developer or operator to fulfil when they apply to us 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 authorise radioactive waste disposal. It also describes the ESC we would expect from the developer/operator of a disposal facility. Key expectations in the guidance are set out using 5 Principles and 14 Requirements.

Our review will be a technical one, seeking to establish whether the principles and requirements within the GRA have been adequately met. We will be looking for application of sound science and engineering. We will need to be convinced by robust, justified and underpinned arguments that continued disposals are safe against the safety criteria detailed within the GRA. We will undertake a thorough review of the submitted material, seeking further information from the operators as necessary. Where we consider it appropriate we may reproduce certain calculations or assessment, or we may undertake more in depth audits to establish the robustness of underpinning information.

Does the Environment Agency have the right skills and capability to complete the review of the Environmental Safety Case?

Yes. The Environment Agency has a dedicated Nuclear Regulation Group (NRG) employing staff with many years experience in the nuclear industry, 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. The NRG is supported by a smaller Nuclear Waste Assessment Team (NWAT). They employ specialist staff with experience in the assessment of nuclear waste issues, including waste disposal, gained through experience in the UK and international nuclear industry. The NRG and NWAT will be leading the review. Further support will also be gained from the wider Environment Agency where there is significant experience in related areas such as landfill engineering, hydrogeology, landfill chemistry, coastal erosion and waste policy. Although the majority of expertise will be accessed from within the Environment Agency, it is anticipated that some highly specialist skills may be brought in through consultants (e.g. criticality assessment).

Why did the Environment Agency authorise the Low Level Waste Repository operators to continue disposals into the existing vault in 2006

7 Near-surface Disposal Facilities on Land for Solid Radioactive Wastes. Guidance on Requirements for Authorisation. The environment agencies. February 2009.

8 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 2010 (DRAFT, Pending Defra's Issue of the Final Version of the Secretary of State's Guidance)

when shortfalls had been identified in the 2002 Environmental Safety Case?

At the time of our 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) will 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.

How and when can individuals or groups influence the outcome of this review?

When we receive the Environmental Safety Case (ESC) in May 2011 we will place it on our public register. It will also be on the operators web site at http://llwrsite.com/environmental-safety-case. If we receive any relevant technical comments after 1 May 2011, whilst we are technically reviewing the ESC, we will take these into account. Where comments are relevant to the operators we will forward them to LLW Repository Limited for consideration. We will also retain all comments received and take them into account as part of our later consultation on the permit. Around mid to late 2012 we anticipate LLW Repository Limited applying for continued disposals. At this point we will be consulting key groups on the application, along with any other interested groups or individuals. We will then consult again on our draft decision. We estimate this will be around the first half of 2013. We will consider all comments received carefully in reaching our decision on the application. We will be seeking comments relevant to our technical review of the ESC and permit application, which address the environmental safety of the proposed disposals. We will not be able to take into account comments that relate to Government policy or that do not relate to our regulatory remit, but we will pass on any such comments to the relevant department.

Who will the Environment Agency consult on any application for further disposals?

We have a number of consultees that we will 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 we would anticipate, as a minimum, consulting: The Health and Safety Executive's Office for Nuclear Regulation, Department of Health, Department for the Environment and Climate Change, Food Standards Agency, Cumbria County Council, Copeland Borough Council, The Health Protection Agency, Drigg and Carleton Parish Council, COMARE, NHS Primary Care Trust, National Farmers Union, Cumbria Sea Fisheries Committee and local pressure groups. We would however expect to consult more widely with other interested groups and individuals.

Why is the review of the Environmental Safety Case and permit application expected to take around 2 years?

The Environmental Safety Case (ESC) is large and complex. It has taken several years to produce and includes a wide range of research. We expect a quality submission that addresses all the requirements

of the Guidance on Requirements for Authorisation (GRA)[9] and that will support an application for disposal. We believe our review is commensurate to the size and complexity of the case, which we expect to be some 10,000 pages plus, with many supporting references. We also believe it is appropriate given the significance of the site to the UK nuclear industry and the potential impacts that could result from the inappropriate disposal of radioactive waste. We need to ensure we have time to complete a thorough and comprehensive review, to determine if the case is robust and demonstrates adequately the safety of future disposals.

How will the Environment Agency, without re-doing the assessment, gain confidence in the conclusions of the operator's Environmental Safety Case?

It is incumbent upon LLW Repository Limited to provide a case that we are able to fully understand, interrogate and review in depth without having to repeat work ourselves. We will review the assessment thoroughly and comprehensively using experts in the field. We will check logic, approach, data, assumptions and calculations amongst other areas of the work. We will repeat some areas of calculation where necessary and/or run simplified models to carry out simple checks. We will ask LLW Repository Limited to repeat work where we consider it necessary. We may choose to audit some key areas of the work in depth.

As well as the final review, we have worked with LLW Repository Limited over the last 4 to 5 years to understand their approach. 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 delivering an acceptable Environmental Safety Case (ESC). Additionally, as a matter of good practice, LLW Repository Limited have established an independent peer review group and international peer review group to review and comment upon their work. The independent peer review group has worked closely with LLW Repository Limited over the last 4 years, reviewing key 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.

The last Environmental Safety Case submitted in 2002 was not considered to have made an adequate case for continued disposals beyond the existing vault. What may have changed since and why might the ESC now be acceptable?

Our review of the 2002 Environmental Safety Cases (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 as:

- Estimates of doses and risks from existing disposals to members of the public in the future significantly exceeded regulatory targets;

9 Near-surface Disposal Facilities on Land for Solid Radioactive Wastes. Guidance on Requirements for Authorisation. The environment agencies. February 2009.

- It was indicated that the Low Level Waste Repository was likely to be destroyed by coastal erosion in a matter of 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).

It is yet to be determined whether the updated ESC has adequately addressed these issues. It is for LLW Repository Limited to demonstrate this is the case. In particular, in reviewing the assessment we will be looking 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 will expect the ESC to clearly explain and justify changes in the assessment since 2002.

Is it really understood what was disposed of at the site in the early days of operation?

There is a degree of uncertainty in the radioactive waste disposed of at the Low Level Waste Repository during the earlier years of operation. Even today, there remains some uncertainty associated with disposals, although this is now greatly reduced by far improved characterisation and monitoring techniques available. We have required that LLW Repository Limited have put in 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 assessment we require LLW Repository Limited to take into account uncertainties within the inventory, like we do in other areas of assessment. The assessment must make suitably pessimistic assumptions and consider the sensitivity of the assessment outcome to variability of the inventory. 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.

What is 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 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 - it's boundaries, the depth of the water table and the acceptable height of disposals which will be subject to planning permission. 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.

Protection of People and the Environment

Will the disposal of Low Level Waste at the Low Level Waste Repository effect the health of people living near the site?

Low Level Waste (LLW) is radioactive and may also contain non-radioactive hazardous materials and so poses a hazard if not handled correctly. However, if handled correctly, the disposal of LLW will not affect the health of people living near the site. We will not permit the site for disposal of LLW 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 the environment. We will ensure that waste disposal is safe for people and not harmful to the environment.

Could the updated Environmental Safety Case show that the disposals are not safe right now?

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, although the new ESC due in May 2011 will need to demonstrate continued safety both in the short and 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.

Will continued operations at the Low Level Waste Repository lower house values in the area?

We see no reason why this should happen, 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 authorised by us have had an impact on house prices.

Could disposals contaminate the food chain?

The applicant will provide 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.

Will continued disposals harm local environmental designated sites?

The applicant will provide 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. 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.

Will continued operations mean increased traffic and disruption (noise, odour, vermin, 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, where this is in compliance with any relevant planning permissions.

We do not anticipate odour being an issue for the Low Level Waste Repository, as Low Level Waste generally contains very few organic waste components which are the source of smells that are often associated with domestic landfills. For the same reason we do not anticipate vermin being an issue, as the Low Level 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.

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.

What about non-radiological impacts arising from the waste?

In addition to a radiological assessment, the applicant must also provide us with an impact assessment for the non-radiological contents of the waste (e.g. metals such as cadmium). 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 same performance standards as 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. We will not permit the site for disposals 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. 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.

If the waste is hazardous, why not dispose of it deeper? What about the Geological Disposal Facility (GDF)?

The disposal of radioactive waste is based on risk[10]. 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. Very Low Level Radioactive waste can be safely disposed of in some landfill type sites. Higher activity LLW requires a greater degree of engineered disposal, such as grouting the waste and disposal in vaults at the Low Level Waste Repository (LLWR). 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 disposal facility to be developed to dispose of waste with higher levels of radioactivity – that is, higher hazards wastes.

How might rising sea level and coastal erosion affect the site? How will the Environment Agency deal with this within the review?

We consider the potential for coastal erosion to be a key issue for the site and expect LLW Repository Limited to have addressed it appropriately within the Environmental Safety Case. We will review any

10 Policy for the long term management of solid radioactive waste in the United Kingdom, Defra, DTI and the Devolved Administrations, March 2007.

assessment carefully and only permit further disposals if, even under these scenarios, impacts are demonstrated to be acceptable against our guidance[11] and UK Low Level Waste Policy[12].

Does society really understand the impacts of radioactive waste and radiation? Are the dose criteria being used appropriate?

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 their recommendations form the basis of radiological protection principles and legislation throughout the world. These ICRP recommendations are reviewed by the Health Protection Agency (HPA) as the relevant UK competent national authority. Its 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 (ESC) will 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 will need to consider a range of possibilities and, building in conservative assumptions into each, address the potential radiation doses. Through this approach the more restrictive scenarios can be identified, and used to derive an upper limit on the quantities of waste that can be dispose of.

What are the expected radiation doses from the disposals?

It is for LLW Repository Limited to present an Environmental Safety Case (ESC) detailing the expected radiation doses arising from disposals. We will review the case to determine whether we accept the case 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 however specified in the UK Low Level Waste Policy[12] and our Guidance on Requirements for Authorisation (GRA)[13].

Will terrorists be able to use any of the materials for their purposes?

No. 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 hard to access. The site has appropriate security controls in place such as fencing and guards. Security of the site is regulated by the Office for Civil Nuclear Security (OCNS).

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11 Near-surface Disposal Facilities on Land for Solid Radioactive Wastes. Guidance on Requirements for Authorisation. The environment agencies. February 2009.

12 Policy for the long term management of solid radioactive waste in the United Kingdom, Defra, DTI and the Devolved Administrations, March 2007.

13 Near-surface Disposal Facilities on Land for Solid Radioactive Wastes. Guidance on Requirements for Authorisation. The environment agencies. February 2009.

What will the discharges from the site be 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 require these to be monitored and relevant data reported to us on a periodic basis.

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 closely monitored 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.

What might be the impacts on groundwater, drinking waters and aquifers?

The Environmental Safety Case (ESC) must address each of these issues as part of the radiological and non-radiological assessment. LLW Repository Limited 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 that any doses resulting from drinking water from a nearby well in the future 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.

Is there a risk of 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. As a result of climate change it is hard to predict how this situation may change, but work undertaken by LLW Repository Limited 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 excepted to advance, eventually leading to erosion and inundation of the site over a period of several hundred to a few thousand years time. As part of the Environmental Safety Case (ESC) we expect LLW Repository Limited to consider the risks of flooding and climate change and to demonstrate that even under reasonably pessimistic scenarios of climate change, impacts remain acceptable against our guidance and Government Policy.

What might the impacts be on Scotland, Ireland or the Isle of Man?

As part of the Environmental Safety Case (ESC) we expect LLW Repository Limited to consider 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 is 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 do occur in the air or sea.

Would the Low Level Waste Repository, as a near surface site, be safe in a natural disaster?

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 consider 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.

Our Role and Responsibilities

What is the Environment Agency's role in reviewing the Environmental Safety Case and regulating the Low Level Waste Repository?

We are responsible for regulating sites that wish to dispose of radioactive waste, such as the Low Level Waste Repository (LLWR). 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 aim to work with site managers and staff to achieve the highest standards of environmental protection. We work closely with the Office for Nuclear Regulation (ONR) of the Health and Safety Executive, who regulate 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 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.

The Environmental Safety Case (ESC) is a key document which demonstrates the environmental safety of disposals. We will therefore review it and use this as a basis for any permit decision, along with our consultation process. We will review the ESC within the scope of Government policy and against our guidance, the GRA[14]. The review of the ESC and any subsequent application for disposal

14 Near-surface Disposal Facilities on Land for Solid Radioactive Wastes. Guidance on Requirements for Authorisation. The environment agencies. February 2009.

will be 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.

Others Involved

What is Cumbria County Council's role?

Cumbria County Council are the relevant Planning Authority for planning permission to construct vaults, closure engineering and for disposal at the LLWR. 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.

What is the role of the Department for Transport?

The Department for Transport (DfT) is responsible for regulating the transport of radioactive materials and waste, including Low Level Waste, between sites. This includes regulation of the safety and containment of such transports.

What is Health Protection Agency's role? Will they monitor the health of local people?

The statutory duty to monitor the health of the local population lies with the local Primary Care Trust, who often ask the Health Protection Agency (HPA) for advice. The HPA 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.

What is the role of the Health and Safety Executive?

The Office for Nuclear Regulation (ONR) of the Health and Safety Executive (HSE) are 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. We are responsible for regulating the disposal of radioactive waste. As part of the regulation of nuclear sites the 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.

What is the role of the 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 associated civil nuclear liabilities, including the Low Level Waste Repository (LLWR) and much of the UK's Low Level Waste (LLW) inventory. The 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.

The NDA aims to accelerate decommissioning and reduce hazards in a safe and cost effective manner. In doing this the LLWR was the first of their sites to be competed for management by contractors. The aim being to bring in the best international expertise to effectively manage the site and in the case of LLWR, wider LLW liabilities. This competition resulted in UK Nuclear Waste Management Ltd winning the competition to manage and operate the LLWR in 2008.

Other Nuclear Issues and Sites

What is the relationship between the Low Level Waste Repository and new nuclear power station build?

There is no explicit relationship. Although new nuclear power stations generate less radioactive waste that older ones, they will still generate some Low Level Waste during operations and also when decommissioned. This waste will require management and ultimately disposal. The Low Level Waste Repository (LLWR) is likely to provide disposal capacity for these sites if it continues to operate. If the LLWR were not available, then alternative disposal facilities would be required.

How much and what sort of Low Level Waste may be generated by new nuclear build?

New nuclear power stations, if built, will generate waste, including Low Level Waste. This is recognised within the UK Nuclear LLW Strategy and also within the Environmental Safety Case (ESC) being submitted by LLW Repository Limited for the Low Level Waste Repository. We are working closely with the developers and operators, along with the Office for Nuclear Regulation of the Health & Safety Executive, 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.

What other Low Level Waste disposal sites are there in the UK?

The Low Level Waste Repository (LLWR) currently provides the largest UK capacity for Low Level Waste (LLW) disposal and handles the broadest range of LLW. However, other LLW disposal sites are operational and applications have been made for new facilities.

Operational sites include Clifton Marsh near Preston in Lancashire, which receives LLW from Springfields Ltd, Sellafield Ltd (at Capenhurst) and Urenco UK Ltd (at Capenhurst). There are also a number of landfills that take small volumes of Low Volume Very Low Level Waste (LV-VLLW) and LLW, mostly from non-nuclear sites such as research and development organisations and hospitals. Sellafield Ltd also operates a landfill at Sellafield, known as CLESA, that takes low end LLW from the site. In April 2011 the operators of the Lillyhall Landfill near Workington were permitted to dispose of High Volume Very Low Level Waste (HV-VLLW).

In Scotland, regulated by the Scottish Environment Protection Agency (SEPA), there are plans to build a LLW repository at Dounreay to take waste from the Dounreay nuclear site. An application is also being considered for a site at Stoneyhill to take Naturally Occurring Radioactive Material (NORM).

In England three proposals for new radioactive waste disposal facilities were in progress as of April 2011:

- A permit application is being considered for disposal of low end LLW at the Kings Cliffe hazardous landfill site in Northamptonshire;
- A varied permit application is being considered for the disposal of low end LLW from a wider range of consigning sites to the Clifton Marsh landfill site near Preston; and
- Planning permission is being sought for a dedicated radioactive waste disposal facility at Keekle Head in West Cumbria, with plans to take low end LLW.

How does the Low Level Waste Repository compare to other similar sites around the world?

The disposal system proposed for the Low Level Waste Repository is not dissimilar 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. 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.

Policy, Regulation and Permissions to Operate the Site

Is planning permission also required for waste disposal at the Low Level Waste Repository?

Yes. Planning permission will be required for the disposal of waste into Vault 9, 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.

How does operation of the Low Level Waste Repository tie in with government 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. For example, application of a risk informed approach and completion of appropriate public consultation. Near surface disposal of Low Level Waste (LLW) is recognised as an appropriate disposal option as is the LLWR, as a centralised national facility for the disposal of LLW. However, it is also recognised that to continue operations the LLWR must demonstrate continued safety. Government policy also requires the Nuclear Decommissioning Authority (NDA) to develop and publish a plan for the optimal use of the LLWR near Drigg, taking into account our regulatory review and uncertainty over future capacity.

What is happening 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.

What is happening in Wales?

UK Government policy on Low Level Waste also applies in Wales. The Environment Agency regulate in both England and Wales. We plan to take the same approach to regulation in Wales as in England (subject to any changes that the Welsh Assembly Government may wish to introduce).

Are 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) will require other permissions and licences to operate. Key amongst these are a Nuclear Site Licence from the Office for Nuclear Regulation of the Health and Safety Executive and Planning Permission from Cumbria County Council. The Environment Agency is also responsible for permitting non-radiological water discharges under the 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 that may be 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 sites 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 may require a submission to be made, such as any significant relaxation to limits within the permit. It is therefore anticipated that an Article 37 submission may be required for the LLWR. Once a submission is made to the EC, a decision is generally provided within six months, dependent on the need to seek any clarification. If an Article 37 submission is required, a positive decision from the EC is needed before we would permit further disposals at the LLWR.

The Future of the Site

What are the possible outcomes, dependent upon how acceptable we find the Environmental Safety Case (ESC)?

Following review of the Environmental Safety Case (ESC) we may find the submission acceptable, or not acceptable, against our guidance. If there are shortfalls in the submission we may seek further information from the applicant. Following this review we anticipate LLW Repository Limited applying to us for continued disposal at the Low Level Waste Repository (LLWR). We will review this application, supported by our review of the ESC and consult upon it. We will then prepare a draft decision and consult upon that. 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 Limited 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 knock on implications for other programmes such as decommissioning at nuclear sites and nuclear new build, 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 LLW liability. Other disposal options would need to be sought, with potentially large time delays and costs associated with this. This risk is recognised by the NDA and LLW Repository Limited 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 the whole UK inventory of LLW, 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 do issue through inspection of the site.

Is another site like the Low Level Waste Repository near Drigg required?

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 any application from LLW Repository Limited 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 take Low Level Waste (LLW) 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 sites capacity to take more waste, as demonstrated within the Environmental Safety Case (ESC). Also, upon the effectiveness of efforts being driven by the UK Nuclear LLW Strategy 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 to take the full range of LLW may not need to be sought for many years.

How will the site be monitored after closure? How do we know it will remain safe in the longer term?

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 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.

How will the site eventually be closed? How will the waste be made safe and who will be responsible for it?

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 sites permit once we are satisfied the site is safe and 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 authority.