Production and Disposal of Low Level Radioactive Waste (LLW & VLLW) in the North East of England

For Durham County Council, Gateshead Council, Newcastle City Council, Northumberland County Council, South Tyneside Council and Sunderland City Council

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Executive Summary

The Waste Planning Authorities of Durham County Council, Gateshead Council, Newcastle City Council, Northumberland County Council, South Tyneside Council and Sunderland City Council have commissioned this study to provide estimates of radioactive waste arisings from the non-nuclear industry within the region and their origins and destinations. This study is intended to inform and support the preparation of Local Plan documents for each of the Waste Planning Authorities involved in the study and is intended to be robust enough to withstand scrutiny at Examination.

This study adds further detail to the regional commercial and industrial (C&I) waste study commissioned by the metropolitan authorities of Tyne and Wear, together with the unitary authorities of Durham and Northumberland. This study examined a number of scenarios for waste arisings and waste management capacity available for the period to 2030. The report focussed on non-hazardous waste from commercial and industrial sources and non-hazardous waste collected by local authorities. However, it is apparent that the data available on the arisings and management of low level (LLW) and very low level (VLLW) radioactive waste is currently inadequate for planning purposes. The aim of this study is therefore to address the data gaps.

This study reviews both the definitions of low level radioactive waste (LLW) and very low level radioactive waste (VLLW), and the current policies and regulations impacting on the production and management of such wastes. The roles of the Environment Agency and the Nuclear Decommissioning Authority are also reviewed in permitting and regulating the disposal of such wastes.

Traditionally, LLW waste has been disposed or stored at the national Low Level Waste Repository (LLWR) near Drigg in Cumbria, but this facility is reaching capacity and cannot be assumed as a long term solution for LLW created in the North East. Through desk research and telephone interviews with LLW producers in the North East and LLW disposal site operators throughout the UK, this study built a picture of what wastes are produced in the region, trends for the future and disposal options for these wastes.

This study concluded that:

LLW and VLLW Arisings

- The 2010 UK Nuclear Waste Inventory undertaken by the NDA, showed that LLW and VLLW arisings in North East England amounted to only 7,103 m^3 near term (1.4% of UK total) and 14,051 m^3 lifetime (0.3% UK total) arisings.

- Although there are over 100 permits issued for the production of low level and very low level radioactive wastes in North East England, many are now inactive due to the closure of the facility in question, due to transfer of production outside of the region, or because the initial permit was for a one-off decommissioning project. However, many hospitals, trusts and universities in the region do hold active permits.

- The nuclear power plant in Hartlepool is due to cease energy production in 2019 and start a lengthy decommissioning process at this date. Long term Intermediate Level Waste[1], Low Level Waste and Very Low Level Waste arisings have been forecast by the NDA for this process. The facility produced 130 m^3 of LLW through normal operations and maintenance in 2012, which was incinerated on site. Non-combustible LLW is sent to the repository near Drigg. In 2012 they sent a single consignment to the facility near Drigg for storage, of some 19 m^3.

- Environment Agency Pollution Inventory data for 2011 suggests that only 23 sites in the region produced LLW and VLLW in 2011. This included a range of hospitals, university laboratories, and commercial laboratories and manufacturers. Arisings are quoted in terms of activity and some 5,922 GBq was produced in 2011. The majority (98%) was disposed of via waste water. Of the remaining material 0.8% was disposed of via incineration and 0.1% via storage in the vaults at the facility near Drigg, all outside of the region. If all of this material had an activity equal to the maximum permitted for LLW, this would be equivalent to 4,878 tonnes via incineration and 418 tonnes via storage.

[1] **Intermediate Level Wastes (ILW)** are wastes exceeding the upper boundaries for Low Level Waste, but which do not require heating to be taken into account in the design of storage or disposal facilities.

Disposal and Available Capacity

As explained above much of the LLW produced in the North East which is not disposed of via wastewater treatment, is either incinerated or sent for storage at the repository near Drigg. There are existing waste management routes to deal with the waste produced by key producers such as hospitals and universities in the North East. There are a number of clinical and hazardous waste incinerators around the UK capable of dealing with the combustible wastes. There are also 3 major commercial landfills available which are capable of taking the non-combustible LLW produced in the region.

Comparing capacity and arisings of LLW is not always straightforward as there is uncertainty in the inventory volumes, and insufficient data on non-nuclear industry sources. Looking at the capacity of facilities pertinent to the disposal of LLW produced in North East England:

- **Incineration:** EA figures for 2011 suggest an annual production of 4,878 tonnes of LLW (based on activity and assumes all waste at maximum LLW limit). This compares to a UK capacity for hazardous and clinical waste disposal of 430,765 tonnes of which 247,469 tonnes was input in 2011 suggesting a utilisation of 56.3%. Of this capacity, the volume of waste produced in the North East amounts to 1.1% and any increases should be accommodated in the available capacity at these facilities. Relevant facilities include (full list given in the appendix):

Operator Name	Installation Name	Planning Sub-Region	Type	Permitted Capacity (tonnage)	Tonnage Incinerated in 2011
S Grundon (Waste) Ltd	Colnbrook, Slough	Berkshire	Clinical	10,000	5,193
SRCL Ltd	Ipswich	Suffolk	Clinical	8,500	7,884
SRCL Ltd	Nottingham	Nottinghamshire	Clinical	6,500	5,640
SRCL Ltd	Ashford, Kent	Kent	Clinical	8,500	7,225
SRCL Ltd	Knostrop Treatment Works, Leeds	West Yorkshire	Clinical	17,000	15,054
Veolia ES Cleanaway (UK) Limited	Ellesmere Port, Wirral	Cheshire	Hazardous	100,000	90,847
Tradebe Fawley Limited	Hythe, Southampton	Hampshire	Hazardous	45,000	31,970

Table 1: Relevant Incineration capacity

- **Landfill:** EA figures for 2011 suggest that 418 tonnes of LLW is produced in the North East (this assumes LLW at maximum activity limit). Assuming that the bulk of this material is clinical and household like mixed waste of a bulk density of 0.2 to 0.25 tonnes/m^3 [2] this would amount to between 1,672 and 2,090m^3 un-compacted.

  For the three existing landfill sites previously described, annual throughput along with the planning situation as currently understood is summarised in the table below. If further consents are granted for these sites throughout the Plan period, the overall position should be monitored to ensure that anticipated capacity is given consent or alternative provision is identified.

Landfill	Operator	Annual Input	Planning Situation
Clifton Marsh, Lancashire	Sita	25,000 m^3 LLW (10% of all waste landfilled at site)	Expires 2015; application expected to extend the period of the permission
Kings Cliffe, Northamptonshire	Augean	25,000-50,000 m^3 (249,999 tpa overall permitted haz waste capacity)	Expires 2016; application to extend to 2026
Lillyhall, Cumbria	FCC	26,000 m^3 (planning limit) (The environmental permit has a limit of 582,000 m^3 in total by 2031 but this is not currently being developed)	Expires 2014; applying for extension to 2029.

Table 2: Current LLW landfill capacity

Therefore the North East annual arisings amount to around 2% of the available LLW landfill capacity.

If the anticipated extensions identified above are granted, then together with the provision of additional capacity at other proposed sites, sufficient void is likely to be available to accommodate LLW arising in the North East until 2029. Taking market forces into account, pressure for local provision is therefore likely to be low.

There is therefore sufficient commercial disposal capacity outside of the region to:

- Reduce reliance on the repository near Drigg
- Dispose of North East generated LLW and VLLW to at least 2029 and therefore negate the need for disposal capacity within the region.

[2] Bulk densities applied in "Commercial and Industrial Waste Survey 2009" Defra, May 2011

Available data demonstrates that there is already sufficient disposal capacity for key waste producers in the region. The locations to which specific regional wastes are sent for disposal are driven by market forces and planning authorities have little influence on such factors.

Recommendations

Based on the results of this study we recommend that:

- As in the majority of cases, LLW and VLLW can be disposed of in conventional facilities for the management of non-hazardous waste such as incinerators or landfill, a significant amount of VLLW and LLW should continue to be managed either at non-hazardous incinerators or non-hazardous landfill sites (within the North East region and further afield). As this study shows, the arisings of VLLW and LLW in the region are low compared to the volumes generated nationally, and as the majority of such material can be managed with municipal waste and commercial and industrial waste, we would suggest that local provision of specialist facilities for this waste stream is not required. Furthermore, the low level of local arisings is unlikely to reach a level of critical mass upon which the development of local facilities could be based.

- The Waste Planning Authorities should work collaboratively with those affected by their Plans, that is to say those Waste Planning Authorities where the strategic disposal facilities for LLW exist (and through them to the operators of these sites), taking account of the 'Duty to Cooperate'. This will avoid making unrealistic assumptions about the availability of capacity to receive waste from the North East authorities during the relevant plan periods and ensure that the most sustainable waste management solutions are sought for this waste stream. Since the quantities of radioactive wastes generated from this study area are reasonably low and the authorities have a collaborative approach to the preparation of this study, the North East local authorities could collectively approach these Local Authorities.

- Waste Planning Authorities should address the management of radioactive wastes in their Waste Plans. In accordance with the principle of communities taking responsibility for their own waste, policies should take account of the following principles:
    - Low Level and Very Low Level Radioactive waste that is considered exempt from the radioactive substances legislation will be managed at the nearest appropriate non-hazardous waste management facilities;
    - Higher activity low level radioactive waste will be managed at the site where they arise, if feasible;
    - Further management capacity will be sought elsewhere if material cannot be safely managed at non-hazardous waste management facilities.

- Waste Planning Authorities should include criteria based policies in their Local Plans to provide spatial guidance as to potential suitable locations for appropriate facilities for the management of radioactive wastes, along with other waste streams, should these be required in the future. These policies should set out that in determining planning applications for new facilities for the management of LLW, account will be taken of all the criteria that would usually be considered with regard to waste management facilities with the additional criteria of the dose of radioactivity to which members of the public could be exposed. Other factors to be considered would include whether the material can be safely managed at the facility, without endangering human health and without harming the environment, having particular regard to the level of radiation generated from the facility; the strategic nature of the facility and the possible need to accept waste from other areas to ensure that the facility is financially viable; and that adequate measures are included to mitigate the adverse impacts on local communities and the environment, taking account of the policy criteria for all waste management facilities. Policies for the management of radioactive waste should take account of the quantities of waste arising identified in this report in identifying possible destinations for their management.

QUALITY ASSURANCE

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REPORT

1 Introduction

1.1 Scope & purpose

The Waste Planning Authorities of Durham County Council; Gateshead Council; Newcastle City Council; Northumberland County Council; South Tyneside Council and Sunderland City Council have commissioned this study to provide estimates of non-nuclear radioactive waste arisings within the region and their origins and destinations. This study is intended to inform and support the preparation of Local Plan documents for each of the Waste Planning Authorities involved in the study and is intended to be robust enough to withstand scrutiny at Examination.

This study adds further detail to the regional C&I waste study commissioned by the metropolitan authorities of Tyne and Wear, together with the unitary authorities of Durham and Northumberland. This study examined a number of scenarios for waste arisings and waste management capacity available for the period to 2030. The report focussed on non-hazardous waste from commercial and industrial sources and non-hazardous waste collected by local authorities. However, it is apparent that the data available on the arisings and management of low level (LLW) and very low level (VLLW) radioactive waste is currently inadequate for planning purposes. The aim of this study is therefore to address these data gaps.

To meet the requirements of national planning policy contained in the National Planning Policy Framework, PPS10 ('Planning Policy Statement 10: Planning for Sustainable Waste Management') and of the European Waste Framework Directive, Waste Planning Authorities must produce robust plans which can deliver an integrated and adequate network of disposal installations. Waste plans must set out the tonnages of waste requiring management in the authority area over the period of the strategy, and provide a location specific spatial strategy for waste sites. Therefore an understanding of the quantities of waste arising in each stream is needed, together with an analysis of current and future management routes for these materials. Whilst for C&I and MSW there is information (including from the recent study into C&I in the North East), the absence of data for non-nuclear low level radioactive waste (LLW) and very low level radioactive waste (VLLW) makes planning more difficult. This may lead to the LLW being managed at existing facilities until their capacity is exhausted and new facilities not being developed in a timely fashion. This may also prejudice the use of the waste hierarchy and lead to an over reliance on the national Low Level Waste Repository near Drigg which is a scarce resource.

Further work is therefore now needed to understand arisings of Low Level Radioactive Waste in the area to inform the local development documents that are being prepared by the Waste Planning Authorities involved in this study. This report summarises the data collected and conclusions developed in the delivery of this study.

1.2 Duty to Cooperate

The joint commissioning of work by a group of Waste Planning Authorities ensures that they will be working to a consistent evidence base using common assumptions. This group comprises the following authorities:

- Durham County Council
- Northumberland County Council
- Gateshead Council
- Newcastle City Council
- South Tyneside Council
- Sunderland City Council

This group of planning authorities will therefore be able to demonstrate that they are meeting the 'Duty to Co-operate' with other affected bodies enshrined in section 110 of the Localism Act 2011 by working together and sharing information. This approach can also be more cost effective than individual authorities working separately.

The "Duty to Co-operate" is not necessarily a duty to agree, but planning authorities must be able to demonstrate that there is a shared understanding of the impact of the policies in their plans. They must also be able to show that these impacts can be managed by both the plan-making authority and the authority where such impacts may be felt, in order for the plan to be deliverable. Where there has not been sufficient engagement between planning authorities, there is a risk that representations will be made objecting to a potential lack of legal compliance of the plan with the Localism Act 2011, as well as its soundness against the tests in the National Planning Policy Framework (NPPF).

This report will form part of the shared evidence base for the planning authorities in the North East to demonstrate that there is good joint working. It also identifies the potential impacts on authorities outside the North East in order to support further discussions with those authorities as to how to manage these impacts.

2 Background

2.1 Types of Radioactive Waste

The publication "The 2010 UK Radioactive Waste Inventory" published by the NDA and DECC in February 2011, describes the various types of radioactive waste as follows:

"Material that has no further use, and is contaminated by, or incorporates, radioactivity above certain levels defined in UK legislation, is known as radioactive waste. Radioactive wastes range from those that contain high concentrations of radioactivity to general industrial and medical wastes that are only lightly contaminated with radioactivity.

In the UK radioactive wastes are classified in terms of the nature and quantity of radioactivity they contain and their heat-generating capacity, as High Level Wastes, Intermediate Level Wastes or Low Level Wastes.

- **High Level Wastes (HLW)** - Wastes in which the temperature may rise significantly as a result of their radioactivity, so this factor has to be taken into account in the design of storage or disposal facilities.
- **Intermediate Level Wastes (ILW)** - Wastes exceeding the upper boundaries for LLW, but which do not require heating to be taken into account in the design of storage or disposal facilities.
- **Low Level Wastes (LLW)** - Wastes having a radioactive content not exceeding 4 GBq (gigabecquerels) per tonne of alpha activity, or 12 GBq per tonne of beta/gamma activity."

The wastes considered in this report are low level radioactive wastes (LLW) and very low level radioactive wastes (VLLW), as defined below. High level wastes are from nuclear sites such as power stations, those facilities that process fuel before and after use at power stations and military installations.

The NDA/DECC report goes on to say:

"The lower activity limit for LLW, below which waste is not required to be subject to specific regulatory control, is:

- For certain natural radionuclides in the uranium and thorium decay chains, the levels specified in Schedule 1 of the Radioactive Substances Act 1993 (RSA93) below which the substances are outside the scope of the Act; or

- For other artificial or man-made radionuclides, the levels laid down in the current suite of Exemption Orders issued under RSA93, below which controls additional to those specified in the Exemption Order, are not required. The most notable of these is the Substances of Low Activity (SoLA) Exemption Order. This specifies a level for exemption from regulatory control of 0.4 Bq (Becquerels) per gram for wastes which are substantially insoluble in water.

Very Low Level Waste (VLLW) is a sub-category of LLW that comprises:

- **Low Volume VLLW** ('dustbin loads') - wastes that can be safely disposed of to an unspecified destination with municipal, commercial or industrial waste, each 0.1 cubic metre of material containing less than 400 kBq (kilobecquerels) of total activity, or single items containing less than 40 kBq of total activity. There are additional limits for carbon-14 and tritium in wastes containing these radionuclides.

- **High Volume VLLW** (bulk disposals) – wastes with maximum concentrations of 4 MBq (megabecquerels) per tonne of total activity that can be disposed of to specified

landfill sites. There is an additional limit for tritium in wastes containing this radionuclide. The principal difference between the two VLLW categories is the need for controls on the total volumes of high volume VLLW being deposited at any one particular landfill site. Low Volume VLLW is generated principally by so called "small users", while most High Volume VLLW is produced at nuclear licensed sites.

Low-level wastes from operating facilities are generally similar to household and commercial & industrial waste and comprise of paper, plastics and scrap metal. When facilities are dismantled and decommissioned there may also be building rubble, soil and steel items such as pipework. Very low-level waste can arise in low volumes, mainly from hospitals and universities that can be safely disposed of with municipal, commercial or industrial waste. It can also arise in high volumes, usually from nuclear sites, in which case it is most likely to be disposed of to specified landfill facilities.

2.2 Appropriate management routes for these materials

In many cases, LLW and VLLW can be disposed of in conventional facilities for the management of non-hazardous waste such as incinerators or landfill. However, this is not possible for high activity LLW or high volume VLLW. The material is often mixed with other non-hazardous waste and is of similar composition to local authority collected waste or other commercial and industrial waste. There is no risk attached to this disposal route and therefore the majority of such facilities do not have any planning or permitting constraints that would prevent this management route. However, public concern at the disposal of LLW and VLLW at "mainstream" waste management facilities may mean that attention is not drawn to this activity. Furthermore, the possibility of LLW and VLLW being managed at non-hazardous waste management facilities may make new planning permissions even harder to deliver than would otherwise be the case.

A significant proportion of LLW has historically been sent to the vaults in the facility near Drigg which is designed for the management of the majority of LLW from nuclear power stations. This means that scarce capacity for higher activity low level radioactive material has been taken up by lower level wastes that could be disposed of in other more widely available facilities.

Consideration is being given to the development of further capacity at the Low Level Repository near Drigg and subject to the proposed development being completed as planned; there will be sufficient capacity at this location until 2079. However, this is contingent on most VLLW from non-nuclear sources being managed at other non-hazardous waste management facilities.

3 Policy & Regulation

3.1 UK Radioactive Waste Policies

The UK Government's radioactive waste management policy is supported by a regulatory framework that aims to ensure that all radioactive wastes are safely and appropriately managed in ways that pose no unacceptable risks to people or the environment.

The Health and Safety Executive (HSE) regulates the safety of nuclear installations in the UK. This work is carried out by an agency of the HSE called the Office for Nuclear Regulation (ONR). Regulation is through a system of licensing of nuclear sites. Licensed sites are either nuclear power stations or associated facilities such as fuel preparation or treatment facilities, and defence installations. The only such site in the North East is the EDF Energy Nuclear power station in Hartlepool. Details of licensed nuclear sites can be found at the ONR website at http://www.hse.gov.uk/nuclear/licensing.htm.

All nuclear installations as defined in the Nuclear Installations Act 1965 (as amended) (NIA65) require a licence from HSE and every activity, including the accumulation and storage of radioactive wastes, must be undertaken in accordance with the conditions HSE attached to the licence. NIA65 does not apply to activities carried out directly by the Ministry of Defence or the armed forces. However, regulation of such operations at MoD sites is to the same standards as at nuclear sites.

The disposal of radioactive wastes from nuclear and non-nuclear sites – including the transfer of solid wastes for burial, incineration or storage elsewhere, as well as the discharge of liquid and gaseous wastes to the environment – is regulated under the Radioactive Substances Act 1993 (RSA93), recently replaced by the Radioactive Substances Regulation for the Environmental Permitting Regulations[3].

The main objectives of Environmental Permitting Regulations are to:

- Establish and maintain control over the keeping, use and security of radioactive materials including sealed radioactive sources and mobile radioactive apparatus;
- Ensure that the accumulation and disposal of radioactive wastes are managed effectively to limit radiological impact on the general public and the environment;
- Ensure operators make appropriate financial provisions for re-use, recycling or disposal of high activity sealed radioactive sources.

By meeting these objectives, EPR delivers Government policy on management of radioactive materials and radioactive wastes and implements European Directive requirements on

[3] Environmental Permitting Guidance Radioactive Substances Regulation For the Environmental Permitting (England and Wales) Regulations 2010, Defra September 2011

radiological protection of the public and security of high activity sealed sources.

The objectives apply to all non-nuclear users of radioactive materials such as hospitals, universities and industrial radiographers. In the case of nuclear site licensees, the disposal of radioactive wastes is regulated by the Environment Agency while the keeping and use of radioactive materials and accumulation of radioactive wastes is regulated by the Office for Nuclear Regulation (ONR).

The regulatory bodies are the Environment Agency (EA) in England and Wales, the Scottish Environmental Protection Agency (SEPA) in Scotland, and the Environment and Heritage Service of the Department of Environment in Northern Ireland (NIEA). For radioactive wastes arising on non-nuclear licenced sites, the environment agencies have regulatory responsibility for both accumulation and disposal. Waste below a certain level of radioactivity is considered exempt and can be disposed of in the same way as non-hazardous waste at landfill or incineration facilities.

Under the Energy Act 2004, the Nuclear Decommissioning Authority (NDA) has direct responsibility for the UK's civil public sector nuclear liabilities. However health and safety, security and environmental protection at the nuclear licensed sites for which the NDA is responsible are legally the responsibility of the Site Licence Companies (SLC) which hold the nuclear site licence and discharge authorisations.

The Ministry of Defence and its contractors, British Energy, Urenco, GE Healthcare and the Minor Waste Producers are responsible for the management of radioactive waste and materials arising on their own sites.

3.2 Policy for LLW management

Responsibility for policy development for radioactive wastes is led by DECC (the Department for Energy and Climate Change) and the devolved administrations of the UK. This is carried out in conjunction with Defra (the Department for the Environment, Food and Rural Affairs). This work is supported by CoRWM (the Committee on Radioactive Waste Management) and the NDA (the Nuclear Decommissioning Authority).

The NDA is responsible for the decommissioning and clean-up of civil nuclear facilities, ensuring that treatment and disposal follow government policy on the long-term management of nuclear waste. CoRWM provides independent scrutiny and advice to the government on the long-term management of higher activity radioactive wastes.

The UK Government's policy on low level radioactive waste (LLW) management is contained in a document published in March 2007 called the "Policy for the Long Term Management of Solid Low Level Radioactive Waste in the United Kingdom" which can be found at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48970/Low_level_waste_policy.pdf.

The policy includes revised regulation around the disposal of LLW to landfill. This means the nuclear industry can now dispose of the following LLW to landfill:

- high volume very low level waste (a new sub-category of LLW)
- controlled burials of LLW.

It is expected that the majority of waste that could go to landfill would consist of rubble and soil from decommissioning activities. This would contain only small amounts of radioactivity and the Environment Agencies will limit the quantities permitted for disposal.

The Low Level Waste policy was designed to address the diminishing capacity issue at the Low Level Waste Repository near Drigg in Cumbria and set out a more flexible, sustainable approach for managing solid low level radioactive waste in the long-term.

Central to the strategy is the implementation of the waste hierarchy: non-creation of waste where practicable; minimisation where creation is unavoidable; re-use and recycling; and, ultimately, disposal.

The strategy also includes how best use can be made of existing disposal capacity, and the extent to which other waste management and disposal options might be employed to accommodate the wide range in the composition and radioactivity of LLW.

A further document called Strategy for the Management of Solid Low Level Radioactive Waste from the Non-Nuclear Industry in the United Kingdom–Part 1 (anthropogenic radionuclides) was published in March 2013 and can be found at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48291/4616-strategy-low-level-radioactive-waste.pdf.

This document has a section on planning for this waste stream and advises that understanding the quantities of local level waste arising is not necessary for planning purposes. However, it is clear that proposals for the management of this waste stream cannot be developed without an understanding of the nature of the material that needs to be managed, and this includes the quantity that needs to be accommodated by the relevant facilities.

There is therefore an absence of national policy in this area which needs to be filled by waste planning authorities working jointly to understand current and future arisings and the availability of appropriate facilities. Much of this work is carried out under the auspices of the Nuclear Legacy Advisory Forum (NuLeAF) which is a special interest group of the Local Government Association. NuLeAF supports liaison between local and central government and further information can be found on their website at http://www.nuleaf.org.uk/.

A planning policy for radioactive waste must be deliverable and the destination facilities for this material must be capable of receiving and managing this waste. Therefore there must be facilities located within the plan area or in other local authority areas that have sufficient capacity to treat or landfill this waste. If specialist facilities are required, there should be clarity as to whether those facilities have sufficient capacity for the plan period. If more commonly

available non-hazardous waste management facilities are used for managing this material, there is a greater likelihood that sufficient capacity will be available. Given that the quantities of radioactive waste involved are small, it is likely that there is sufficient management capacity for this waste stream using both types of facility.

3.3 Role of the Environment Agency

Large quantities of radioactive waste have been produced as a result of the country's nuclear energy, research and defence programmes. Radioactive waste continues to be produced from nuclear sites and other users of radioactive material such as hospitals and universities. As older nuclear sites in England and Wales reach the end of their operational lives, the sites will be decommissioned and cleaned up. This will considerably increase the amount of radioactive waste produced; mainly as waste containing low levels of radioactivity. All of this radioactive waste needs to be properly managed and dealt with to protect people and the environment, both now and in the future. Disposal options include near surface disposal for waste containing low levels of radioactivity and geological disposal in an engineered underground facility for waste containing higher levels of radioactivity.

The Environment Agency strictly regulates how users of radioactive substances dispose of their radioactive waste. This is facilitated by granting permits that place limits on disposal of solid waste to land and on discharges to water and air.

The Environment Agency has recently published guidance on how they regulate the disposal of low level radioactive waste to landfill sites. This guidance follows a new Government policy that offers increased flexibility for managing this type of waste through options such as disposal to landfill and other similar facilities.

Almost all low-level waste from the nuclear power industry, hospitals, research establishments and defence programmes is disposed of at the Low Level Waste Repository near Drigg in Cumbria. However, this site does not have the capacity to meet future needs in the long term unless the proposed extension to the facility is developed.

In March 2007 the Government introduced policy on managing low-level waste. The policy includes revised regulation around the disposal of low-level waste to landfill. This means the nuclear industry can now dispose of very low-level waste and some low-level waste to landfill. It is expected that the majority of waste that could go to landfill would consist of rubble and soil from decommissioning activities and contain only small amounts of radioactivity. The EA will limit the quantities authorised for disposal. This policy was updated in August 2010 by the NDA in their "Policy for the Management of Low Level Waste from the Nuclear Industry" which can be found at http://www.nda.gov.uk/documents/upload/UK-Strategy-for-the-Management-of-Solid-Low-Level-Radioactive-Waste-from-the-Nuclear-Industry-August-2010.pdf .

Further guidance can be found in DECC's "Strategy for the Management of solid low level waste from the non-nuclear industry" Part 1 Anthropogenic Radionuclides (March 2010) at

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48291/4616-strategy-low-level-radioactive-waste.pdf. Most radioactive waste is subject to the Environmental Permitting (England and Wales) Regulations 2010 (EPR10). A permit is not generally required for activities involving radioactive wastes that are exempt from requiring an environmental permit by section 15 of the Radioactive Substances Act 1993.

However, the Waste (England and Wales) Regulations 2011 brings wastes under three particular radioactive substances exemptions orders into waste control. When radioactive waste requires a permit as a radioactive substances activity under EPR10 but has one or more hazardous properties, it is not covered by hazardous waste controls. However, where radioactive waste is exempt from requiring an environmental permit as a radioactive substances activity under EPR10, it is subject to hazardous waste controls if it has one or more hazardous properties arising, other than from its radioactive nature.

Items that are exempt (although not necessarily hazardous waste) include:

- Some clocks and watches
- Luminous items
- Uranium and thorium compounds
- Smoke detectors

3.4 LLW Policies and Permitting

The Government's Policy Statement of 2007 advises the Environment Agency to ensure that holders of EPR permits which allow the disposal of radioactive waste apply the waste hierarchy as defined in the Statement. Such permit holders should prepare case-specific and proportionate waste management plans. The Environment Agency is expected to deliver these and other requirements, through environmental permitting.

On nuclear licensed sites, the Environment Agency regulates the disposal of solid waste, as well as liquid and gaseous discharges. The ONR regulates the on-site arising and storage of waste from a health and safety perspective.

For Low Level Radioactive Waste (LLW), operators should:

- Not create waste if possible ("avoidance");
- Reduce waste arisings by activity and/or mass ("minimisation");
- Investigate decay storage, re-use and recycle prior to considering disposal.

The policy also asks that a radioactive waste management plan should be supplied as part of a permit application for radioactive waste disposal, explaining what waste management routes for solid waste have been considered and decided upon by the operator, a consideration of how the waste hierarchy has been applied, and how the proximity principle has been addressed.

In preparing waste management plans, an operator should carry out an options assessment setting out what options have been considered for the management of solid Low Level Radioactive Waste (LLW). An options assessment is any formal and recorded method by which the preferred solution is determined from a number of possible alternatives. Review of the assessment by the Environment Agency would be necessary. The Environment Agency should provide guidance on options assessment and selection.

The proximity principle was introduced in Article 5 of the Waste Framework Directive (75/442/EEC as amended by Directive 91/156/EEC) in 1997. This has now been superseded by the 2008 Waste Framework Directive which has been implemented in England and Wales through the Waste Regulations 2011[4] . In terms of planning policy, PPS10 states that authorities should "provide a framework in which communities take more responsibility for their own waste" and this is incorporated into UK waste strategy documents. Applying this approach means enabling waste to be disposed of in one of the nearest appropriate installations by means of the most appropriate methods and technologies in order to ensure a high standard of protection to the environment and public health. Options assessments carried out to support the development of LLW management plans might include disposal to a centralised facility but must also consider other possible solutions, taking account of the proximity principle. However, although the aim to avoid excessive transportation of materials is an important consideration, it must be balanced with all the other relevant factors on a case by case basis.

The principle of proportionality applies to radioactive waste management plans and factors such as the waste type, radiological, chemical and physical characteristics, and available disposal options should be taken into account. In the case of smaller sites, a waste management plan may simply consist of a brief description of waste disposal options and considerations. For sites that present a high potential environmental hazard (for instance, in the nuclear sector), a more detailed plan is likely to be required.

Operators who dispose of wastes by transfer to other sites must hold an environmental permit for these transfers, unless the waste is excluded or exempted.

Operators of sites receiving Low Volume Very Low Level Radioactive Waste (LV-VLLW) do not require an environmental permit to dispose of radioactive waste at those sites under these Regulations. For landfill sites receiving High Volume Very Low Level Radioactive Waste (HV-

[4] http://www.legislation.gov.uk/ukdsi/2011/9780111506462/contents

VLLW), the Environment Agency needs to be assured that the radiological capacity of the landfill is not exceeded.

Certain LLW waste streams may be appropriate for "controlled burial" arrangements. Controlled burial applies to circumstances where the VLLW thresholds have been exceeded, and where the destination site can demonstrate that radiological protection criteria have been met. An operator of a landfill site where controlled burial is to take place must hold an environmental permit for radioactive waste disposal under these Regulations.

Dedicated disposal facilities may be developed solely for LLW or HV-VLLW. These may be situated on or off nuclear sites. An operator of such a site will need to hold an environmental permit for disposal of radioactive waste. The Environment Agency should also consider the non-radiological impact of the radioactive waste being disposed of and may place conditions in the environmental permit in relation to such non-radiological properties.

Exemptions

Exempt means that no radioactive substances permit is required under EPR or RSA93 to accumulate and dispose of VLLW, or for receipt and disposal of the waste by a person who manages substantial quantities of non-radioactive waste by burial in landfill, incineration or recovery, provided that the conditions specified are met. In this context management of waste includes disposal, recovery or treatment.

New or varied open source permits will not have a VLLW condition unless the user cannot operate under the exemption provision, e.g. more than the maximum allowed quantities need to be disposed of.

Limits on disposal of exempt VLLW are generally up to 200 MBq of radionuclides except H-3 and C-14 and 2 GBq of H-3 and C-14 in a year[5]. This is equivalent to 50 cubic metres per year of each type of VLLW at the maximum concentrations. Higher volumes can be disposed of if the concentrations are lower. Amounts above this need to be permitted.

Some organisations will have permits for disposal of solid radioactive waste and additionally dispose of exempt VLLW to the same place. It is recommended that consignments of permitted radioactive waste are not mixed with exempt VLLW (or other exempt waste) as that would introduce uncertainty about what waste is in which category.

[5] General Guidance on the use of Exemption Provisions, The Environmental Permitting Regulations 2011 http://a0768b4a8a31e106d8b0-50dc802554eb38a24458b98ff72d550b.r19.cf3.rackcdn.com/geho1111bukf-e-e.pdf

3.5 Role of the Nuclear Decommissioning Authority

The Nuclear Decommissioning Authority (NDA)[6] does not produce radioactive waste, but has responsibility for overseeing continuing operations and the decommissioning and clean up at its 19 sites. It has established Site Licence Companies, which carry the licences to operate these sites:

- Sellafield Ltd operates Sellafield and the adjacent Windscale and Calder Hall sites in Cumbria and Capenhurst in Cheshire. Sellafield is a large, complex nuclear chemical facility undertaking spent nuclear fuel reprocessing, mixed oxide (MOX) fuel fabrication and providing LLW treatment services. At Windscale the site's research and development facilities, including its three reactors, are being decommissioned. Calder Hall houses a Magnox power station; this is no longer operational and is being decommissioned. At Capenhurst in Cheshire the redundant uranium enrichment diffusion plant is being decommissioned.
- Magnox South operates five Magnox sites: Berkeley in Gloucestershire; Bradwell in Essex; Dungeness A in Kent; Hinkley Point A in Somerset; Sizewell A in Suffolk. These power stations are no longer operational and are being decommissioned.
- Magnox North operates five Magnox sites: Oldbury in South Gloucestershire and Wylfa in Anglesey have operational power stations; stations at Chapelcross near Annan in Dumfries and Galloway, Hunterston A in Ayrshire and Trawsfynydd in Gwynedd are no longer operational and are being decommissioned.
- LLW Repository Ltd operates the Low Level Waste Repository (LLWR) near the village of Drigg in Cumbria. The site has operated as a national disposal and storage facility for Low Level Waste since 1959.
- Dounreay Site Restoration Ltd operates Dounreay in Caithness. The site was the UK centre for fast reactor research and development comprising three reactors, fuel reprocessing and various other fuel cycle facilities. The reactors and other facilities are no longer operational and are being decommissioned.
- Research Sites Restoration Ltd operated Harwell in Oxfordshire and Winfrith in Dorset. These sites carried out nuclear research and development work. All facilities, including a number of research, experimental and prototype reactors, have closed down and have either already been decommissioned or are currently being decommissioned.
- Springfield Fuels Ltd operates Springfields near Preston in Lancashire. Nuclear fuel products are manufactured for the UK's nuclear power stations and for international customers. Natural uranium hexafluoride is supplied to Urenco and other organisations for enrichment.

Since September 2009 certain suitable LLW has been processed in a metals recycling facility at Workington in Cumbria. This facility uses size reduction and shot-blasting techniques to

[6] The 2010 UK Radioactive Waste Inventory, NDA DECC, February 2011

minimise quantities of LLW metal sent for disposal to the LLWR. The recovered material can be released back into the scrap metals market for a variety of uses. A small quantity of secondary waste is generated and consigned to the LLWR for disposal. In practice there is some LLW which, because of its radionuclide content or its physical/chemical properties, may have to be managed along with ILW. Of the total amount of LLW forecast from the operation and decommissioning of current nuclear plant, less than one per cent by volume is unsuitable for the LLWR.

3.6 Planning

Planning policy for managing radioactive waste is contained in the National Planning Policy Framework and PPS10 Planning for Sustainable Waste Management. These documents do not contain any specific references to the issues concerning planning for this waste stream in particular. In some aspects, the issues involved are not significantly different to planning for other waste streams. The key additional element that needs to be considered is the level of radiation that might be emitted from a potential facility managing this waste stream and the doses to which members of the public or workers at the facility could be exposed.

If it is possible to manage radioactive waste in non-hazardous waste management facilities, then this approach will be deliverable. However, planning authorities with specialist radioactive waste management sites in their plan area will need to be confident that they will not suffer significant impacts through the import of radioactive wastes from other authorities. Each waste plan-making authority therefore needs to develop a policy to encourage the responsibility for the management of this waste stream within its own community by seeking appropriate facilities in close proximity where possible.

The Government's "Strategy for the Management of Solid Low Level Radioactive Waste from the Non-Nuclear Industry in the United Kingdom" (DECC 2012) states that "Exempt low volume VLLW is currently disposed to landfills and incinerators used for handling Directive waste. No special provisions need to be addressed in environmental permits, and no extra provisions need to be made by waste planning authorities to allow this practice to continue." However, this position does not apply to waste that is not exempt. It is therefore important to ensure that waste that is subject to regulation is being correctly managed and that if this needs to be sent to specialist facilities, those facilities have sufficient capacity. Those authorities where such facilities are located will need to be consulted accordingly. If satisfactory liaison does not take place, there may be a challenge that a waste plan has not complied with the Duty to Co-operate as defined in the Localism Act and not considered the potential impacts on other authorities.

An assessment of the quantities and types of material arising is therefore an important first step in understanding what impacts there may be on other authorities. The development of a policy would then follow to include the following elements:

- Low Level and Very Low Level Radioactive waste that is considered exempt from the radioactive substances legislation will be managed at the nearest appropriate non-hazardous waste management facilities;
- Higher activity low level radioactive waste will be managed at the site where they arise where possible;
- Further management capacity will be sought elsewhere if material cannot be safely managed at non-hazardous waste management facilities.

Those authorities with licenced nuclear sites (Hartlepool) must liaise with the operator of the facility over the future management of radioactive wastes arising at that site.

4 LLW Sources and Arisings

4.1 Sources of Radioactive Wastes

Radioactive wastes are produced in the UK as a result of the generation of electricity in nuclear power stations and from the associated production and processing of the nuclear fuel. However, LLW and VLLW also arise from the use of radioactive materials in industry, medicine and research, and from military nuclear programmes. Radioactive wastes may contain Naturally Occurring Radioactive Materials (NORM), generally uranium, thorium and the products into which they decay, and radioactive materials arising from the activities of man. These can be generated by the oil and gas and other associated industries.

Most of the “man-made” radioactive materials result from the fission (splitting) of uranium atoms in nuclear reactors. They include fission products themselves (and their radioactive decay products), and activation products (and their radioactive decay products) produced in reactor internal and structural materials by the absorption of neutrons released during the fission process. Some of the radioactive materials used in medicine, industry and research, which can give rise to radioactive wastes, are produced in particle accelerators rather than nuclear reactors.

Low level waste arises mainly from the civil nuclear industry during power generation and decommissioning activities. It is also generated by research, healthcare, defence, construction & demolition and oil & gas industries. It consists of a wide range of materials used in a radioactive operating environment such as paper, cardboard, plastic, protective clothing, soil, rubble and metal. The radioactive content of such material is low. To put this into context, low level waste is less radioactive than some naturally occurring rocks found across the UK. Low Level Waste makes up more than 90 per cent of the UK's radioactive waste legacy by volume but contains less than 0.1 per cent of the total radioactivity.

4.2 UK Waste inventory & volumes

The UK Radioactive Waste Inventory (UKRWI) is the UK's reference dataset on radioactive waste, which is updated usually on a 3 yearly cycle. The NDA currently manages the process on behalf of DECC.

The information is collated from the UK's major radioactive waste producers and quantifies existing stocks, and forecast arisings. The inventory focusses on major radioactive waste sources, and therefore includes energy plants and similar facilities, but not the small volume producers of LLW such as hospitals and universities.

The latest inventory was published in April 2010. Its aim was to provide comprehensive and up-to-date data in an open and transparent manner for those interested in radioactive waste issues. It was part of an on-going programme of research jointly conducted by DECC and NDA.

Preparation of the 2010 Inventory involved the compilation and assessment of detailed numerical and descriptive information for 1,312 waste streams. The data was provided by the organisations that operate sites in the UK where there were radioactive wastes. Data relating to all activities, including defence, were included on a voluntary basis. The 2010 Inventory comprised of a full update of waste stream volumes and a partial update of other information. The information provided was checked for consistency and correct use of reporting conventions. However no attempt was made to validate the assumptions or quantities reported, which were those of the waste producers.

The Inventory does not include liquid and gaseous wastes containing very low concentrations of radioactivity that are routinely discharged to the environment in accordance with statutory regulations. Discharges are made within authorised limits, usually after some form of treatment. Also excluded are small quantities of solid wastes with very low concentrations of radioactivity typically from hospitals, universities and the non-nuclear industry (small users) that can be disposed of with domestic refuse to landfill, either directly or after incineration.

The inventory names 36 major waste producing sites in the UK. In the North East region, the single major waste producing site is the nuclear power station at Hartlepool.

Category	Major waste producers	Minor waste producers
HLW		None produced
ILW		
LLW		See Note 1
VLLW sub category	See Note 2	See Note 3

Wastes included in 2010 Inventory

Note 1: Excludes low volumes of waste that can be disposed of by "controlled burial" at landfill sites.

Note 2: Includes High Volume VLLW from facilities decommissioning and site clean up at nuclear licensed sites. However some waste producers have chosen to report potentially contaminated ground in the Radioactive Materials report [1] until there is more certainty on the volumes that might arise (see Chapter 4.9).

Note 3: Not reported in the Inventory. Such VLLW is of low volume and is disposed of separately, or with municipal, commercial and industrial wastes, at landfill sites. It is not mixed with controlled waste.

Figure 1: Wastes reported in the Inventory (Source: The 2010 UK Radioactive Waste Inventory, NDA/DECC)

Waste at 1 April 2010

Waste at 1 April 2010 comprised of radioactive materials that had been declared as waste and were being held at this date. The volumes reported are those that the wastes occupied in tanks, vaults, silos, drums etc. in which they were contained.

Most of the wastes existed in either an untreated or partly treated state. Many wastes were treated shortly after they arose, principally to reduce volume and so minimise containment requirements. Treatments included evaporation of liquid wastes and compaction of solid wastes. As an example, the volume of liquid HLW refers to the amount of liquor stored in a tank after evaporation and not to the amount of liquor arising directly from the first stage of spent fuel reprocessing. Similarly, suitable solid LLW is routinely compacted within mild steel drums, and the number of these drums determines the volume.

At 1 April 2010 some wastes had already been conditioned in suitable containers for long term management, mostly by encapsulation in a cement-based medium, or in the case of HLW in glass.

Future waste arisings

These are radioactive materials that waste producers forecast will be declared as waste at some specified time in the future. Most of the radioactivity already exists (for example in reactor structures), but will only arise as waste during the decommissioning of nuclear facilities and site clean-up. Other radioactive waste - that from future planned operations - has yet to be produced. In general the volumes of future arisings reported reflect current waste management practices. So for most future arisings the volume reported is that for untreated or partly treated waste. There are a small number of waste streams where fresh arisings are being conditioned

directly in suitable containers for long-term management. For these wastes, the volume reported is the conditioned volume.

A reliable forecast of future waste arisings is required for planning waste handling, storage, transport and the capacity of waste processing facilities.

The volumes of future waste arisings are given for financial years April to March, not calendar years; although for medium and longer-term forecasts this distinction is unlikely to matter. For simplicity in presentation and discussion of waste volumes the financial year April 2010 to March 2011, for example, is referred to as '2010', and the period April 2010 to March 2011, for example, is referred to as '2010-2011'.

Most radioactive waste produced by minor waste producers is not reported in the UK Inventory as it is either low volumes of LLW that can be disposed of by "controlled burial" at landfill sites, or low volume VLLW that can be disposed of with municipal, commercial and industrial wastes at landfill sites.

The rates of arisings from the minor waste producers that are reported in the 2010 Inventory are difficult to predict. In recent years annual arisings of LLW have fallen, and are now at very low levels. Future arisings are expected to be minimal. Most LLW reported in the 2010 Inventory is consigned to the LLWR near Drigg. The rate of future arisings of this LLW is assumed to be the same as current arisings, and is estimated up to 2080.

The inventories and forecasts for all radioactive wastes were reported as follows:

	HLW	ILW	LLW	Total
Total	**1,020**	**287,000**	**4,430,000**	**4,720,000**
At 1.4.2010	1,620	94,300	66,000	**162,000**
Future arisings	-601	192,000	4,360,000	**4,550,000**
Arisings 2010	-96	2,340	47,100	**49,400**
Arisings 2011-2014	-331	7,700	147,000	**155,000**
Arisings 2015-2019	-226	9,760	202,000	**211,000**
Arisings 2020-2029	51.8	17,400	305,000	**323,000**
Arisings 2030-2039	0	21,600	220,000	**241,000**
Arisings 2040-2059	0	40,500	893,000	**934,000**
Arisings 2060-2099	0	65,200	1,490,000	**1,560,000**
Arisings post 2100	0	27,800	1,060,000	**1,080,000**

Table 3: All wastes volume at 1 April 2010 and estimated for future arisings (m^3)

The 2010 Inventory also predicts distribution of LLW and VLLW per region of the UK as follows, again from energy sources and excluding small scale sources such as hospitals and universities:

UK Region	Volume (m^3)	%
North West	216,770	43.3
Scotland	140,263	28.0
South East	93,804	18.7
South West	24,771	5.0
Wales	8,612	1.7
North East	7,103	1.4
East	6,599	1.3
Other	1,675	0.3
East Midlands	730	0.1
West Midlands	62	0.0
TOTAL	**500,389**	100

Table 4: Near-term Regional Distribution of Raw LLW and VLLW (2010 - 2020)

UK Region	Volume (m^3)	%
North West	3,609,707	81.5
Scotland	277,298	6.3
South East	190,772	4.3
South West	134,803	3.0
Wales	106,126	2.4
East	86,158	1.9
North East	14,051	0.3

UK Region	Volume (m^3)	%
Other	7,841	0.2
East Midlands	730	0.0
West Midlands	100	0.0
TOTAL	**4,427,586**	100

Table 5: Lifetime UK Regional Distribution of Raw LLW and VLLW (2010 - 2120)

Both short and long term forecasts show the North East as a low generator of LLW and VLLW from energy plant sources, ranging from 1.4% of UK total to 2020, 0.3% to 2120.

4.3 Other Sources of LLW Data

Although a comprehensive study, the UK Waste Inventory focusses on the production of radioactive wastes by the nuclear energy industry. Although relevant to this study through the Hartlepool nuclear energy facility, the figures do not include low volume or landfilled arisings from non-nuclear facilities. There are other sources we have reviewed for such data:

4.3.1 DECC Survey in 2008

The study "Data collection on solid low-level waste from the non-nuclear sector, DECC 2008" was based upon an on-line survey which was conducted of waste arisings in the Low Level Radioactive Waste (LLW) category from premises authorised under the Radioactive Substances Act 1993 in the non-nuclear sector; that is, premises which do not, in addition, hold a licence under the Nuclear Installations Act 1965.

The purpose of the survey was to support the development of a national strategy for management of LLW from the non-nuclear sector. There are 877 facilities in England, Scotland and Wales that hold RSA93 authorisations in the non-nuclear sector. Of the 766 facilities contacted via the survey, 35% have responded to the questionnaire.

The results of this survey relevant to the North East of England are summarised in the table below:

Authority	Quantity arising (cubic metres)
Durham	4,253
Gateshead	26
South Tyneside	0.1
Sunderland	1
Darlington	0.25
Redcar and Cleveland	0.1
Other North East authorities areas	No arisings reported

Table 6: Low Level Radioactive Waste Arisings per local authority area in 2008

However, these figures must be treated with caution, in that there is no explanation of the anomalously high figure for Durham, and arisings would be expected, for instance for a city like Newcastle with a number of hospitals and universities. There is no additional data from the original work to interrogate to explain these anomalies.

4.3.2 Environment Agency Permit Data

Through the permitting of LLW production and the recording of arisings (by activity) via the Pollution Inventory, some arisings data is available. This has been obtained and reviewed in delivery of this study, with telephone interviews identifying the current status of issued permits.

4.4 Sources of Radioactive Waste in the North East Region

A key outcome of this study is to evaluate the current production of LLW in the North East region and to ascertain what currently happens to this waste. This section of the report examines the data available, both from third party sources and that generated in the delivery of this study.

4.4.1 Hartlepool Nuclear Power Station

As previously discussed, the Hartlepool nuclear power station, on Tees Road in Hartlepool, is the single facility of its type within the region. The site's postal address is County Durham but within the unitary local authority area of Hartlepool Borough Council.

EDF Energy through its licence holder company British Energy Generation Ltd operates Advanced Gas-cooled Reactor (AGR) power stations at seven sites, including at Hartlepool.

The Hartlepool site comprises of two operating Advanced Gas-Cooled Reactors (AGR) that became operational in 1983. It is expected that the station will continue generating electricity up to 2014. (NB: Since 2010 Inventory data was compiled, EDF Energy has announced an operational life extension for Hartlepool of 5 years to 2019.)

The plant's net electrical output is 1180 MW (i.e. capable of supplying nearly 2.5 million households). Its output for the year ended 31 December 2011 was 7.4 TWh.

The facility is expected to:

- Cease operation in 2019
- Have defueling and care & maintenance preparations running from 2019-2027 (*)
- Have care & maintenance from 2027 to 2104
- Undergo final site clearance 2104 to 2112.

(*) The reactor will be defuelled and the fuel transferred for reprocessing or storage. Non-radioactive buildings and plant external to the reactor area will be dismantled. Accumulated operational waste will be retrieved and packaged. A Safestore will be constructed to retain all of the active plant and materials on the site in a safe and secure state. These activities are assumed to take about 8 years. Significant plant decommissioning activities that were planned to take place coincident with reactor dismantling (about 85 years after the end of generation) will now be carried out in the first few years following reactor shutdown. (source: The 2010 UK Radioactive Waste Inventory, NDA/DECC)

2010 Waste Inventory for Hartlepool

Table 7 below (derived from table A3.4 from the 2010 inventory) gives waste volume at 1 April 2010, and gives the number of packages, packaged volume and conditioned volume once all wastes at 1 April 2010 and for future arisings have been packaged.

Packaging is the loading of waste into a container for long-term management. Typically the packaged waste volume is between 20% and 50% greater than the conditioned waste volume, depending on the type of container. There are a number of radioactive waste packaging plants operating in the UK.

LLW package numbers exclude those streams suitable for landfill disposal, as the UK 2010 Inventory does not compile information on waste packaging for this disposal route.

The figures given in the 2010 Inventory for future waste arisings are projections made by the organisations that operate sites where radioactive waste is generated on the basis of their assumptions as to the nature, scale and timing of future operations and activities. These projections represent their planning positions at 1 April 2010, which have been constructed for the purpose of preparing data for the 2010 Inventory. Future arisings estimates include the impact of operations such as decommissioning.

The 2010 Inventory quantifies waste for the Hartlepool site as:

Waste Category	Raw, Partially treated and conditioned wastes (m^3)	When all wastes are conditioned		
	Volume as stored	No of packages	Package Volume	Conditioned Volume
Radioactive Waste at 01.04.10				
ILW	310			
LLW	37			
Total	347			
All Radioactive Waste at 01.04.10 and future arisings (ie.when all waste at 01.04.10 and future arisings are packaged)				
ILW	3,460	420	7,680	5,530
LLW	14,100	746	14,700	12,700
Total	17,560	1,166	22,380	18,230

Table 7: 2010 Inventory for Hartlepool (EDF Energy) site (m^3)

Fate

Telephone discussions with the facility itself revealed that they produced around 130 m^3 of LLW through normal operations and maintenance in 2012, which was incinerated. Non-combustible LLW is sent to the repository near Drigg. In 2012 they sent a single consignment to the facility near Drigg for treatment or storage, of some 19 m^3.

4.4.2 Permitted producers in the North East region

Appendix 1 gives all the sites in the North East subject to remitting for LLW and VLLW, obtained from the Public Registers held by the Environment Agency. This data includes sites permitted since the 1990s and attempts we made to contact all sites by telephone to get an update on current status and if possible a measure of LLW and VLLW produced in 2012.

Three main sources of LLW were identified and surveyed:

1. Businesses – mainly from the following sectors:
    - Chemicals and Pharmaceuticals
    - Engineering
    - Munitions
    - Waste disposal
    - Nuclear decommissioning
    - Test and medical laboratories
    - Offshore test and decommissioning
    - Factory demolition and refit

2. Hospitals – Trusts and hospital groupings around the region, including a transfusion centre and neurochemical pathology department

3. Universities – including Durham, Newcastle, Northumbria and Sunderland

The public registers list permits per producer type, for the North East region local authorities as follows:

Local Authority Area	Businesses	Hospitals	Universities
Darlington	1	1	
County Durham	4	2	2
Gateshead	4	1	
Hartlepool	3	1	
Middlesbrough	1	2	
Newcastle upon Tyne	1	5	5
North Tyneside	4		
Northumberland	8	1	
Redcar & Cleveland	16		
South Tyneside	4	1	
Sunderland	1	2	1
Stockton-On-Tees	16	1	1

Table 8: Number of permits (active and in-active) per North East England local authority area

The results of this telephone survey are given in Appendix 1. These show the following:

1. Many business sites have ceased production or trading, or have moved production to other parts of the UK, reducing significantly the amount of LLW and VLLW produced in the region.
2. A number of permits were issued for single events such as factory decommissioning and demolition, or have lapsed because the sites involved no longer produce LLW or VLLW.
3. Many regional hospital Trusts jointly procure radioactive waste disposal as the North Clinical Waste Consortium, but their representative was not happy to release arisings data to us. North Clinical Waste Consortium has 3 disposal routes. All material goes out of the region to SRCL in Knowsthorpe (Leeds) to 2 x incinerator and a storage site. They have a licence to put all liquids down the drains.
4. All business and public sector sites holding active permits were reluctant to divulge information on the quantities of waste produced, waste types and destinations although some data was obtained. This is summarised in Appendix 1 per site.

4.4.3 North East Radioactive Waste Production & Disposal 2011

Waste producers need to report to the Pollution Inventory if they hold a radioactive waste disposal authorisation and dispose of radionuclides above the Schedule 2 limits in the Radioactive Substances Act 1993.

The Environment Agency has provided for a fee, Radioactive Waste Production & Disposal data. Appendix 2 shows Pollution Inventory data to show data from RAS (Radioactive Substances) sites in the North East region, for the 2011 reporting year (Environment Agency).

Data is provided by operator name and includes substance, disposal route and quantity released as radioactive activity in Becquerels where:

1 kilobecquerel = 1,000 becquerels
1 megabecquerel = 1,000,000 becquerels
1 gigabecquerel = 1,000,000,000 becquerels

Those sites reporting waste production are listed below in Table 8. Table 9 gives the quantities disposed of in tonnes.

Operator Name	Disposal Route Name	Total Activity in bequerels
Blychem Ltd	Air	19,590,000,000
	Wastewater	2.0565E+11
BP Exploration Operating Co Ltd	Transfers - Other Radioactive Waste	880,000
City Hospitals Sunderland NHS Foundation Trust	Transfers - Radioactive Waste Incineration	2,900,000
	Wastewater	7.10183E+11
County Durham And Darlington Acute Hospitals NHS Trust	Transfers - Radioactive Waste Incineration	1,700,000
	Wastewater	1.76747E+11
County Durham And Darlington NHS Foundation Trust	Transfers - Radioactive Waste Incineration	4,000,000
	Wastewater	2.84924E+11
Covance Laboratories Ltd	Air	1,434,000,000
	Transfers - Radioactive Waste Incineration	35,795,000,000
	Wastewater	16,167,000,000
Doosan Babcock Energy Ltd	Transfers - Radioactive Waste Incineration	8,487,000,000
Ids Ltd	Transfers - Radioactive Waste Incineration	41,000,000
	Wastewater	24,048,000,000

Operator Name	Disposal Route Name	Total Activity in bequerels
International Centre For Life	Wastewater	219,760,000
Lotte Chemical Uk Limited	Transfers - Radioactive Waste Disposal near Drigg	4,322,000
Newcastle Upon Tyne Hospitals NHS Trust (Freeman Hospital)	Transfers - Radioactive Waste Incineration	18,300,000
	Wastewater	1.84033E+12
North Tees And Hartlepool NHS Trust	Transfers - Radioactive Waste Incineration	2,000,000
	Wastewater	9.10259E+11
Procter And Gamble Technical Centres Limited	Transfers - Radioactive Waste Incineration	200,000
	Wastewater	7420000
Scm Pharma Ltd	Transfers - Radioactive Waste Incineration	199,280,000
South Tees Hospitals NHS Trust	Transfers - Radioactive Waste Incineration	1,000,000
	Wastewater	8.9549E+11
South Tyneside NHS Foundation Trust	Wastewater	4,064,000,000
The Newcastle Upon Tyne Hospitals NHS Foundation Trust	Transfers - Radioactive Waste Incineration	1,958,000,000
	Wastewater	7.39398E+11
Tioxide Europe Ltd	Transfers - Radioactive Waste Disposal near Drigg	1,718,000,000
University of Durham	Transfers - Radioactive Waste Incineration	120,000
	Wastewater	334,300,000
University of Newcastle (King George Vi Buildings)	Transfers - Radioactive Waste Incineration	31,386,000
	Wastewater	3,847,860,000
University of Newcastle Upon Tyne (The Centre For Brain Ageing And Vitality)	Wastewater	40,920,000,000
Grand Total		**5.92187E+12**

Table 9: Radioactive Waste Production and Disposal by Site 2011 (source: Environment Agency)

These consist mainly of:

- Hospitals and Trusts
- University Laboratories
- Chemical and related businesses

Reported activities show:

- A significant number of sites with permits to dispose of waste via waste water treatment; ignoring waste type, over 98% of the radioactive activity generated in the North East is disposed of this way.

- Other disposal routes including radioactive waste incineration (0.8% total) and disposal near Drigg (0.1%).

LLW is defined as "wastes having a radioactive content not exceeding 4 GBq (gigabecquerels) per tonne of alpha activity, or 12 GBq per tonne of beta/gamma activity."

Therefore to give a measure of waste quantity per waste producers, the reported activities per sites were converted into tonnes on the basis that:

- For alpha activity, 1 tonne waste = 4 GBq activity

- For beta/gamma activity, 1 tonne waste = 12 GBq activity

This assumes the maximum permitted activity per tonne.

Based upon these assumptions, calculations suggest that:

- 4,878 tonnes of low level radioactive waste was collected in 2011 for transfer to incineration facilities (summarised in **Error! Reference source not found.**)

- 418 tonnes of low level radioactive waste was collected in 2011 for deposit near Drigg (summarised in Table 11) of LLW waste requiring disposal.

It should be noted that this is a working approximate conversion and that it is likely that the actual volumes of material involved are significantly lower.

OPERATOR NAME	SUBSTANCE NAME	QUANTITY RELEASED	UNIT OF MEASURE	Tonnes as LLW
NORTH TEES AND HARTLEPOOL NHS TRUST	Total Beta/Gamma (Excl Tritium)	2	megabecquerels	0.17
SOUTH TEES HOSPITALS NHS TRUST	Total Beta/Gamma (Excl Tritium)	1	megabecquerels	0.08
CITY HOSPITALS SUNDERLAND NHS FOUNDATION TRUST	Total Beta/Gamma (Excl Tritium)	2.9	megabecquerels	0.24
COUNTY DURHAM AND DARLINGTON ACUTE HOSPITALS NHS TRUST	Total Beta/Gamma (Excl Tritium)	1.7	megabecquerels	0.14
UNIVERSITY OF NEWCASTLE	Total Beta/Gamma (Excl Tritium)	20.298	megabecquerels	1.69
PROCTER AND GAMBLE TECHNICAL CENTRES LIMITED	Total Beta/Gamma (Excl Tritium)	0.2	megabecquerels	0.02
UNIVERSITY OF DURHAM	Total Beta/Gamma (Excl Tritium)	40	kilobecquerels	0.00
COVANCE LABORATORIES LTD	Total Beta/Gamma (Excl Tritium)	35795	megabecquerels	2,982.92
IDS LTD	Total Beta/Gamma (Excl Tritium)	41	megabecquerels	3.42
SCM PHARMA LTD	Total Beta/Gamma (Excl Tritium)	199.28	megabecquerels	16.61
THE NEWCASTLE UPON TYNE HOSPITALS NHS FOUNDATION TRUST	Total Beta/Gamma (Excl Tritium)	1943	megabecquerels	161.92
DOOSAN BABCOCK ENERGY LTD	Total Beta/Gamma (Excl Tritium)	2.474	gigabecquerels	206.17
DOOSAN BABCOCK ENERGY LTD	Total Alpha	6.013	gigabecquerels	1,503.25
COUNTY DURHAM AND DARLINGTON NHS FOUNDATION TRUST	Total Beta/Gamma (Excl Tritium)	4	megabecquerels	0.33
NEWCASTLE UPON TYNE HOSPITALS NHS TRUST (FREEMAN HOSPITAL)	Total Beta/Gamma (Excl Tritium)	18.3	megabecquerels	1.53
Total				**4878.49**

Table 10: LLW production from IPC records, 2011: Transfer for Incineration

OPERATORNAME	SUBSTANCENAME	QUANTITYRELEASED	UNITOFMEASURE	Tonnes as LLW
TIOXIDE EUROPE LTD	Total Alpha	1644	megabecquerels	411.00
TIOXIDE EUROPE LTD	Total Beta/Gamma (Excl Tritium)	74	megabecquerels	6.17
LOTTE CHEMICAL UK LIMITED	Total Beta/Gamma (Excl Tritium)	4.322	megabecquerels	0.36
BP EXPLORATION OPERATING CO LTD	Total Beta/Gamma (Excl Tritium)	440000	becquerels	0.04
BP EXPLORATION OPERATING CO LTD	Total Alpha	440000	becquerels	0.04
Total				**417.61**

Table 11: LLW production from IPC records, 2011: Transfer to the LLWR near Drigg

4.4.4 Supply chain from source to disposal

Telephone interviews with a number of LLW producers have shown that as well as the traditional waste management companies such as Sita and FCC, a number of specialist companies, including SRCL (formerly White Rose Environmental), are involved in the collection and subsequent disposal of low level radioactive wastes.

This includes collection and disposal for the North Clinical Waste Consortium, a collection of local hospitals and Trusts that procure their LLW disposal contract collectively. A number of transfer stations in the region handle such waste before transporting outside of the region for disposal.

4.5 Trends and Future Arisings

Forecasting future arisings of LLW is not easy, particularly in terms of quantity. Historical data for LLW from the non-nuclear industries suggests that LLW production has decreased over the last 2 decades, primarily through the closure of local facilities including chemical companies and associated facilities, which produced such wastes as a by-product of their normal operation.

In the future there are a number of factors which may have an impact on future arisings. These include:

- Decommissioning of nuclear energy facilities, including the facility at Hartlepool (forecast 2019)

- Decommissioning of North Sea oilfield related facilities and pipelines, which carry low levels of radioactivity from natural sources ie. Naturally Occurring Radioactive Material (NORM). This is typically in the form of scale within the internals of pipework and equipment used to extract oil. Although decommissioning may result in short term increases in waste produced, the UK Strategy for the Management of Solid Low Level Waste from the Nuclear Industry (2010) suggested these volumes will reduce to zero by 2041[7]. DECC is currently undertaking a study to understand the volumes and types of waste included in this waste stream and a report is expected to be available in 2014.

- Wastewater generated during the fracking process can contain naturally occurring radioactive materials (NORM) and therefore potentially if this form of natural gas recovery increases, the amount of radioactive waste produced could increase.

[7] http://llwrsite.com/national-waste-programme/national-llw-strategy/

5 Disposal Options

The National Low Level Waste policy was announced in March 2007 to address the diminishing capacity issue at the LLWR and set out a more flexible, sustainable approach for managing solid low level radioactive waste in the long-term. NDA has published a UK wide strategy for managing LLW from the nuclear industry. Central to the strategy is the implementation of the waste hierarchy ie:

- Non-creation of waste where practicable;
- Minimisation where creation is unavoidable; re-use and recycling;
- Ultimately disposal.

The strategy also includes how best use can be made of existing disposal capacity, and the extent to which other waste management and disposal options might be employed to accommodate the wide range in the make-up and radioactivity of LLW.

Disposal routes for solid low activity radioactive wastes already exist in the UK. A significant amount of VLLW and LLW is managed either at non-hazardous incinerators or non-hazardous landfill sites. Very few such facilities have specific restrictions on the receipt of this material and they are therefore available as an increasingly important disposal route.

Currently, most low activity waste is sent to the LLWR near Drigg in Cumbria or in certain cases to specific landfill sites. There are also plans to construct a shallow, engineered LLW disposal facility adjacent to the Dounreay site in Caithness. This will take wastes from decommissioning at Dounreay and the neighbouring Vulcan nuclear site. The facility is scheduled to operate from 2014 subject to regulatory consent.

Since September 2009 certain suitable LLW has been processed in a metals recycling facility at Workington in Cumbria. This facility uses size reduction and shot-blasting techniques to minimise quantities of LLW metal sent for disposal to the LLWR. The recovered material can be released back into the scrap metals market for a variety of uses. A small quantity of secondary waste is generated and consigned to the LLWR for disposal. In practice there is some LLW which, because of its radionuclide content or its physical/chemical properties, may have to be managed along with ILW. Of the total amount of LLW forecast from the operation and decommissioning of current nuclear plant, less than one per cent by volume is unsuitable for the LLWR.

5.1 National Repository (LLWR)

The Low Level Waste Repository (LLWR) has operated as a national LLW disposal facility since 1959, near Drigg in Cumbria. Waste was originally disposed by tipping into trenches which have now been capped off. Following a major upgrade of disposal operations in 1995, the waste is now placed in engineered concrete vaults.

Suitable LLW is compacted and placed in containers before being transferred to the area of the LLWR that includes a grouting facility for these containers. The final waste packages are then placed in the vaults.

The UK 2010 National Inventory forecasts a long term demand of 4.4 million m^3 of raw LLW, of which packaging increases volume by factor of 1.5 to 6.4 million m^3 (if disposed to LLWR). This compares to a maximum vault capacity for LLWR of 1.7 million m^3.

The operators claim the repository can last until 2130 – but only if they manage the space wisely via:

- Recycling & volume reduction
- Alternative solutions for LA LLW & VLLW

5.2 Other facilities

The revised LLW policy of 2007 opened up alternative options for LLW and VLLW disposal i.e. current UK disposal facilities at:

- Sita - Clifton Marsh, Lancashire (National)
- Augean - Kings Cliffe, Northamptonshire (National)
- FCC – Lillyhall, Cumbria (National)
- Sellafield – CLESA (*) (Onsite only)

(*1) On site Calder Landfill Extension Segregated Area (CLESA). Formerly for inerts, then engineered containment for VLLW -120,000 m^3 remaining capacity.

Key sites include:

5.2.1 Sita - Clifton Marsh, Preston, Lancashire

Sita (Lancashire) Ltd applied for a permit to dispose of low level radioactive waste (LLW) in November 2009. The site already held a permit, under the Environmental Permitting Regulations, to dispose of controlled waste. Separate authorisations under the Radioactive Substances Act allowed disposal of low level radioactive waste at the site. The authorisations held by sites that consigned waste to Clifton Marsh, had been in force for over twenty years.

The application was for receipt and on-site disposal of a range of waste material types from existing and potential new customers. The waste material types included decommissioning and demolition rubble, redundant plant and equipment, contaminated protective clothing and residues containing naturally-occurring radioactive material (NORM). Its average bulk activity would be below 200 Bq/g.

In March 2011 the European Commission responded favourably on the Article 37 submission made by Sita. The Environment Agency consulted on the application and draft permit with local stakeholders in June 2011. Local authorities, elected members, the Office for Nuclear Regulation, Foods Standards Agency, members of the public and other interested parties, were all invited to comment and Sita considered their responses.

In August 2012 the Agency issued a radioactive substances activity environmental permit to Sita effective from 1 September 2012.

The main source of the low activity wastes at Clifton Marsh is the nearby Springfields Fuels complex, which employs nearly 2,000 people. A small volume of waste is also received from the Capenhurst site in Cheshire. The majority of these wastes are created from operations at these sites, which manufacture fuel for nuclear power stations. In recent years, wastes from decommissioning redundant facilities on these sites have also been disposed of at Clifton Marsh.

5.2.2 Augean - Kings Cliffe, Northamptonshire

Augean South Ltd applied for a permit to dispose of low level radioactive waste (LLW) in July 2009.This application was for the disposal of solid LLW, (with a specific activity of less than or equal to 200 Bq/g) and High Volume Very Low Level Waste (HV-VLLW), at East Northants Resource Management Facility, Stamford Road, Kings Cliffe, Northamptonshire, PE8 6XX.

Their application stated that the waste would mainly be generated from the decommissioning and clean-up of nuclear industry sites and would consist of items such as crushed concrete, soils, and bricks. The Environment Agency consulted on the original application and requested and received additional information in November 2009. They decided to grant the permit. The Agency then consulted on the proposed permit and explanatory document from 19th February 2010 to 12th March 2010. A permit was granted on 25th May 2011.

With regard to planning, a Development Consent Order was granted in July 2013 for the construction of new landfill void for the disposal of hazardous wastes and LLW with an activity level of up to 200Bq/g and an input rate of up to 150,000tpa.

The East Northants Resource Management Facility, Kings Cliffe operates as a hazardous landfill and is permitted to accept hazardous waste as well as LLW, which typically arise in the UK from the decommissioning of nuclear power stations, science and research facilities, hospitals and manufacturing. The site also operates a stabilisation plant capable of treating Air Pollution Control Residues (APCR) from the incineration of household wastes.

The facility also treats a broad range of contaminated soils from the brownfield remediation markets utilising a number of proven technologies including washing, bioremediation and particle and density separation to enhance recovery and disposal.

In addition, a purpose-built laboratory is based at the site providing a broad range of analytical capabilities following approved methods, whether it be waste characterisation and composition reports or compliance testing for processed wastes.

Augean also have:

- NORM treatment facilities at Port Clarence (Middlesbrough) with a capacity of 6 GBq per year.
- Permit for 10,000 tpa LLW at their incinerator at Sandwich in Kent (formerly Pfizer facility)

5.2.3 FCC – Lillyhall, Cumbria

Waste Recycling Group (now FCC) applied for a permit to dispose of High Volume Very Low Level Waste (HV-VLLW) to the Lillyhall Landfill Site at Joseph Noble Road, Cumbria in May 2009. The application was to dispose of no more than 26,000 m3 of HV-VLLW per year and if the landfill remained operational until 2031, no more than 582,000 m3 of HV-VLLW in total. This waste is to be disposed of alongside non-radioactive waste, which is already being taken to the site. FCC anticipated that the majority of waste would arise from decommissioning activities at nuclear sites.

The Environment Agency consulted on the application and draft permit with local stakeholders in October 2009. In March 2011 the European Commission responded favourably on the Article 37 submission made by Waste Recycling Group. The Agency issued the permit to Waste Recycling Group on 6 April 2011

Current planning permission expires in 2014 and FCC is currently considering applying for a life time extension and changes to other conditions. This will be dependent upon inputs as volumes are reducing (the landfill is not only for the disposal of VLLW).

5.3 Potential facilities

As well as the existing landfills for LLW, there are a number of planned facilities. Proposed facilities for the disposal of LLW and VLLW include:

- DSRL - Dounreay (Onsite only)
- Sita - Keekle Head (National)
- LLWR- Reuse in Cap
- Sellafield- Future landfill

5.3.1 Sita Keekle Head, Cumbria

The facility is designed for the disposal of 1 million cubic metres of Low Level and Very Low Level radioactive waste i.e. 20,000 tonnes/ year waste (plus packing materials) over a 50 year period. It will consist of 9 cells with a series of engineered layers and is designed to provide a robust structure with a proposed life of 300 years.

Note Sita UK and Nuvia Ltd are also currently developing a landfill site at Stoneyhill near Peterhead in Aberdeenshire to treat and dispose of waste contaminated with NORM generated from the oil and gas industry.

5.3.2 Future Disposal Options

It can therefore be seen that the existing dedicated sites that are capable of managing LLW are of very varying size, from Kings Cliffe which can accept up to 150,000 tonnes per annum of hazardous and low level radioactive wastes combined, to Clifton Marsh which can accept 10,000 tonnes per annum of LLW, of which not more than 4,000 tonnes per annum can originate from sites outside the North-West region. It might therefore be concluded that it is unlikely to be economic to develop a site to manage LLW that managed less than 10,000 tonnes per annum.

It is apparent that the quantities of LLW that are produced in the North East Region are in the order of 5,000 tonnes per annum (see paragraph 4.4.3) and therefore there is unlikely to be sufficient material arising in the region to justify the development of a dedicated facility. However, this position should be kept under review, particularly in view of the possible increase in radioactive waste material that requires management that may arise from the oil exploration industry.

In the mean time, a significant proportion of LLW is managed through the waste water management system, or through the use of non-hazardous waste management facilities.

The criteria that have been used for the decision-making process in granting planning permission and permits for the disposal of LLW at existing sites have included the following elements:

- the potential for harm to be caused to human health or the environment;
- risk to water, air, soil, plants or animals;
- nuisance caused through noise or odour;
- potential for harm to be caused to areas of special interest.

These are not considerably different to the issues that must be taken into account in the grant of planning permission for other non-hazardous waste management sites. Other issues that would

need to be taken into account include access and traffic impacts, impacts on landscape and visual amenity, hydrology and hydrogeology.

The additional factor that would need to be taken into account in considering a planning application for a LLW management facility is the level of radiation that would be generated from the facility. While the level of activity from a radioactive source is measured in becquerels, the amount of radiation or dose absorbed by the body is measured in grays (Gy) where one gray is one joule of energy absorbed by 1kg of a body. In order to take account of the fact that different types of radiation affect the body differently, the dose equivalent of radiation is measured in sieverts (Sv). A dose of 1 gray of beta particles, gamma rays or X-rays will give you a dose equivalent of 1 sievert while a dose of 1 gray of alpha particles will give you a dose equivalent of 20 sieverts.

The legal dose limit for workers in the nuclear industry is 20 millisieverts per annum while the legal dose for members of the public from non-natural sources is one millisievert per annum. This compares with the average exposure for an individual in the UK or 2.2 millisieverts per annum from natural sources such as cosmic rays.

As an example of the level of radiation that could be expected to result from the development of a LLW management facility, the site at Kings Cliffe in Northamptonshire is designed to permit less than 0.02 millisieverts per annum to members of the public.

5.4 Combustible Wastes – LLW Incinerators

In the UK there are currently 10 incineration facilities available for the disposal of LLW, of which most are situated on current nuclear power station sites. There are a number of commercial options in the UK and abroad which combine disposal of LLW with other hazardous materials such as chemicals and clinical waste. These include:

- Veolia – facility at Ellesmere Port for high temperature incineration and treatment of Low Level Radioactive Waste (LLW) materials;
- Tradebe – facility at Fawley, Southampton; The only high temperature incinerator in the UK with the facility to process industrial waste packaged in drums or intermediate bulk containers (IBCs) and on pallets. Operating at a temperature of 1,100C. Taking hazardous wastes and LLW;
- Grundons – Colnbrook (Nr Heathrow), clinical waste incineration plus LLW. Capacities:
    - Alpha – up to 5 MBq per month
    - Beta/gamma – up to 300 GBq per day (radionuclide specific);

- SCRL - can incinerate all alpha, beta and gamma radionuclides, along with clinical wastes; facilities include Cross Green in Leeds;
- Studsvik – a facility in Workington which recycles low-level radioactive waste metals and significantly reduces their volume.

EA arisings figures suggest that the bulk of LLW generated in North East England which is not disposed of via waste water, is disposed of at such incineration facilities.

The full list of clinical and hazardous waste incinerators operating in the UK, is given in Appendix 3 extracted from Environment Agency returns and permitted capacity data for 2011. These figures show that in 2011:

- Throughput at these facilities amounted to 247,469 tonnes (between 2006 and 2011, this throughput has been max 263,509 t (2010) min 242,795 t (2006))
- Total permitted capacity is 430,765 tonnes suggesting a utilisation of 56.3%

5.5 Capacity Consideration

Comparing capacity and arisings of LLW is not always straightforward as there is uncertainty in the inventory volumes, and insufficient data on non-nuclear sources. However, a recent study by the NDA concluded that:

- There is adequate capacity in the existing Permitted sites until December 2016.
- There will be adequate capacity until around 2026-2030 if planning consents are extended.
- There is adequate capacity in both northern and southern regions.

However, this analysis did not consider other potential users of these facilities (e.g. non-nuclear, NORM, etc.). The NDA concluded that there is a need to improve the accuracy of the inventory data with respect to volumes and classification, and they are aiming to finalise and publish a report in Spring 2013 on long term LLW capacity availability.

Looking at the capacity of facilities pertinent to the disposal of LLW produced in North East England:

- **Incineration:** EA figures for 2011 suggest an annual production of 4,878 tonnes of LLW (based on activity and assumes all waste at maximum LLW limit). This compares to a UK capacity of hazardous and clinical waste capacity of 430,765 tonnes of which 247,469t was input in 2011 suggesting a utilisation of 56.3%. Of this capacity, the volume of waste produced in the North East amounts to 1.1% and any increases should be accommodated in the available capacity at these facilities.

- **Landfill:** EA figures for 2011 suggest that 418 tonnes of LLW is produced in the North East (this assumes LLW at maximum activity limit). Assuming that the bulk of this

material is clinical and household like mixed waste of a bulk density of 0.2 to 0.25[8] tonnes per cubic metre, this would amount to between 1,672 and 2,090m^3 uncompacted.

For the 3 existing landfills previously described, annual throughput along with planning situation can be summarised as follows:

Landfill	Operator	Annual Input	Current Planning Situation
Clifton Marsh, Lancashire	Sita	25,000 m^3 LLW (10% of all waste landfilled at site)	Expires 2015; application expected to extend.
Kings Cliffe, Northamptonshire	Augean	25,000-50,000 m^3 (249,999 tpa overall permitted haz waste capacity)	Expires 2016; application to extend to 2026.
Lillyhall, Cumbria	FCC	26,000 m^3 (planning limit) (582,000 m^3 total by 2031)	Expires 2014; applying for extension to 2029.

Table 12: Current LLW landfill capacity

Therefore the North East annual arisings amount to around 2% of the available LLW landfill capacity. If the expected landfill extensions are granted, sufficient void should be available to accommodate this LLW to 2029. This does not include the additional capacity proposed at Keekle Head.

[8] Bulk densities applied in "Commercial and Industrial Waste Survey 2009" Defra, May 2011

6 Conclusions for North East Waste Plans & Policy

Traditionally, LLW waste has been treated or stored at the repository near Drigg, but this facility is reaching capacity and cannot be assumed as a long term solution for LLW created in the North East. Through desk research and telephone interviews with LLW producers in the North East and LLW disposal site operators throughout the UK, this study builds a picture of what wastes are produced in the region, trends for the future and disposal options for these wastes.

This study concludes that:

LLW and VLLW Arisings

- The 2010 UK Nuclear Waste Inventory undertaken by the NDA, showed that LLW and VLLW arisings in North East England amounted to only 7,103 m^3 near term (1.4% of UK total) and 14,051 m^3 lifetime (0.3% UK total) arisings.

- Although there are over 100 permits issued for the production of low level and very low level radioactive wastes in North East England, many are now inactive due to the closure of the facility in question, due to transfer of production outside of the region, or because the initial permit was for a one-off decommissioning project. However, many hospitals, trusts and universities in the region do hold active permits.

- The nuclear power plant in Hartlepool is due to cease energy production in 2019 and start a lengthy decommissioning process at this date. Long term ILW, LLW and VLLW arisings have been forecast by the NDA for this process. The facility produced 130 m^3 of LLW through normal operations and maintenance in 2012, which was incinerated on site. Non-combustible LLW is sent to the repository near Drigg. In 2012 the plant sent a single consignment to the facility near Drigg for treatment or storage, of some 19 m^3.

- Environment Agency Pollution Inventory data for 2011 suggests that only 23 sites in the region produced LLW and VLLW in 2011. This included a range of hospitals, university laboratories, and commercial laboratories and manufacturers. Arisings are quoted in terms of activity and some 5,922 GBq was produced in 2011. The majority (98%) was disposed of via waste water. Of the remaining material 0.8% was disposed of via incineration and 0.1% via landfill or storage (near Drigg), all outside of the region. If all of this material had an activity equal to the maximum permitted for LLW, this would be equivalent to 4,878 tonnes via incineration and 418 tonnes via landfill.

Disposal and Available Capacity

As explained above much of the LLW produced in the North East which is not disposed of via wastewater treatment, is either incinerated or sent for treatment or storage at the repository near Drigg. There are a number of clinical and hazardous waste incinerators around the UK capable of dealing with the combustible wastes. There are also 3 major commercial landfills available which are capable of taking the non-combustible LLW produced in the region.

Comparing capacity and arisings of LLW is not always straightforward as there is uncertainty in the inventory volumes, and insufficient data on non-nuclear sources. Looking at the capacity of facilities pertinent to the disposal of LLW produced in North East England:

- **Incineration:** EA figures for 2011 suggest an annual production of 4,878 tonnes of LLW (based on activity and assumes all waste at maximum LLW limit). This compares to a UK capacity of hazardous and clinical waste capacity of 430,765 tonnes of which 247,469t was input in 2011 suggesting a utilisation of 56.3%. Of this capacity, the volume of waste produced in the North East amounts to 1.1% and any increases should be accommodated in the available capacity at these facilities.

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For the 3 existing landfills previously described, annual throughput along with planning situation can be summarised as follows:

Landfill	Operator	Annual Input	Planning Situation
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Lillyhall, Cumbria	FCC	26,000 m^3 (planning limit) (582,000 m^3 total by 2031)	Expires 2014; applying for extension to 2029.

Table 13: Current LLW landfill capacity

[9] Bulk densities applied in "Commercial and Industrial Waste Survey 2009" Defra, May 2011

Therefore the North East annual arisings amount to around 2% of the currently available LLW landfill capacity. Over time, the available capacity may reduce if additional permissions are not granted, although the risk of this is reduced by the recent grant of permission for the disposal of LLW at the Kings Cliffe site in Northamptonshire. It should be noted that the Northamptonshire site is likely to be the main site used by facilities located in the southern and central parts of England.

Taking anticipated extensions in account, and the provision of additional capacity at other proposed sites, sufficient void should be available to accommodate North East LLW to 2029. Taking market forces into account, pressure for local provision is likely to be low.

Therefore we would maintain that there is sufficient commercial disposal capacity outside of the region to:

- Reduce reliance on the repository near Drigg
- Dispose of North East generated LLW and VLLW to at least 2029 and therefore negate the need for disposal capacity within the region.

Recommendations

In line with the waste hierarchy, the most sustainable approach to the management of radioactive waste would be to reduce the quantity of waste produced. Where radioactive waste material is produced, the most sustainable approach to its management would be to reduce or recycle the material, and then to dispose of it in the nearest possible suitable location, in order to avoid emissions from the use of transport. However, sites are only suitable if they meet the necessary environmental criteria, including the appropriate geology, for the protection of human health. Economic and market considerations must also be taken into account in the choice of the best location to use for disposal of this material.

Based on the results of this study we recommend that:

- As in the majority of cases LLW and VLLW can be disposed of in conventional facilities for the management of non-hazardous waste such as incinerators or landfill, a significant amount of VLLW and LLW should continue to be managed either at non-hazardous incinerators or non-hazardous landfill sites (within the North East region and further afield). As this study shows, the arisings of VLLW and LLW in the North East region are low compared to the volumes generated nationally, and as the majority of such material can be managed with municipal waste and commercial and industrial waste, we would suggest that local provision of specialist facilities in local plans for this waste stream is not required. Furthermore, the low level of local arisings is unlikely to reach a level of critical mass upon which the development of local facilities could be based.
- The Waste Planning Authorities should work collaboratively with those affected by their Plans, that is to say those Waste Planning Authorities where the strategic disposal facilities for LLW exist (and through them to the operators of these sites), taking

account of the 'Duty to Cooperate'. This will avoid making unrealistic assumptions about the availability of capacity to receive waste from the North East authorities during the relevant plan periods and ensure that the most sustainable waste management solutions are sought for this waste stream. Since the quantities of radioactive wastes generated from this study area are reasonably low and the authorities have a collaborative approach to the preparation of this study, the North East local authorities could collectively approach these Local Authorities.

- Waste Planning Authorities should address the management of radioactive wastes in their Waste Plans. In accordance with the principle of communities taking responsibility for their own waste, policies should take account of the following principles:
    - Low Level and Very Low Level Radioactive waste that is considered exempt from the radioactive substances legislation will be managed at the nearest appropriate non-hazardous waste management facilities;
    - Higher activity low level radioactive waste will be managed at the site where they arise, if feasible;
    - Further management capacity will be sought elsewhere if material cannot be safely managed at non-hazardous waste management facilities.

- Waste Planning Authorities should include criteria based policies in their Local Plans to provide spatial guidance as to potential suitable locations for appropriate facilities for the management of radioactive wastes, along with other waste streams, should these be required in the future. These policies should set out that in determining planning applications for new facilities for the management of LLW, account will be taken of all the criteria that would usually be considered with regard to waste management facilities with the additional criteria of the dose of radioactivity to which members of the public could be exposed. Other factors to be considered would include whether the material can be safely managed at the facility, without endangering human health and without harming the environment, having particular regard to the level of radiation generated from the facility; the strategic nature of the facility and the possible need to accept waste from other areas to ensure that the facility is financially viable; and that adequate measures are included to mitigate the adverse impacts on local communities and the environment, taking account of the policy criteria for all waste management facilities. Policies for the management of radioactive waste should take account of the quantities of waste arising identified in this report in identifying possible destinations for their management.

1. Permitted Sites in the North East Region

Source: Original source of permit data from Public Registers at the Environment Agency; updated notes from contacting all sites identified as holding a permit for LLW/VLLW.

1.1. Businesses

Permission No:	Permission Holder:	Site Address:	Site Post Code:	Original Approved Date:	Approved Date:	RSA Section Definition:	Notes
Darlington							
AC1431	Ineos Newton Aycliffe LTD. Hydro Polymers Ltd	School Aycliffe Lane, Newton Aycliffe, County Durham	DL5 6EA	N/a	31/03/1991	Disposal of radioactive waste (was RSA60 section 6)	
Durham							
BI6210, BW5241, aw9749	DYTECH CORPORATION LTD	DYCAT INTERNATIONAL,WEST HUNWICK WORKS, HUNWICK, CROOK, COUNTY DURHAM	DL15 0LE		07/07/2000	Disposal of radioactive waste (was RSA60 section 6)	Contacting company revealed that Dycat International are no longer trading on this site.
AC0770 BL0774	DYSON INDUSTRIES LTD	WEST HUNWICK WORKS, HUNWICK, CROOK, COUNTY DURHAM	DL15 0LE		31/03/1991	Disposal of radioactive waste (was RSA60 section 6)	

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BE7362, CD7434, BE7379, BW4938	GORDON LABORATORY GROUP LTD	SALTERS LANE, SEDGEFIELD, STOCKTON-ON-TEES, CLEVELAND	TS21 3EE	16/08/1999	16/08/1999	Disposal of radioactive waste (was RSA60 section 6) Keeping and use of radioactive materials (was RSE60 section 1)	Business no longer trading (Companies House)
AD4258	ZZZZ BIOPROCESSING	UNIT 26,1 INDUSTRIAL ESTATE, CONSETT, COUNTY DURHAM	DH8 6TJ		31/03/1991	Disposal of radioactive waste (was RSA60 section 6)	Company could not be traced.
Gateshead companies							
CD4010, CA3548	Studsvick Uk Ltd	UNIT 14, PRINCES PARK 4TH AVENUE,TEAM VALLEY TRADING ESTATE, GATESHEAD, TYNE AND WEAR	NE11 0NF	17/05/2006	23/04/2009	Disposal of radioactive waste (was RSA60 section 6)	Business no longer produces on this site. All treatment of LLW takes place in Workington.
BF8402	Now SRCL. Was White Rose Environmental Ltd	UNIT 1, CHAINBRIDGE ROAD IND EST,TUNDRY WAY,BLAYDON, NEWCASTLE UPON TYNE	NE21 5SJ	N/a	26/08/1999	Disposal of radioactive waste (was RSA60 section 6)	SRCL is part of Stericycle and officially became SRCL on 1 January 2008. There is no radioactive waste permit in SRCL's name for this site. Only have a transport depot in Newcastle now and no LLW is produced on site.

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BE7567	BAE SYSTEMS LAND SYSTEMS (MUNITIONS AND ORDNANCE) PLC	1 Radial Park Road Washington, NE37 1PA UK. BRITISH AEROSPACE DIVISION,AMMUNITION DIVISION GEORGE STREET ,BIRTLEY, DURHAM	DH3 1QY	N/a	14/12/1998	Keeping and use of radioactive materials (was RSE60 section 1)	This site has been demolished.
AD4593, AD6074, CD4699	Doosan Babcock Energy Ltd	MITSUI BABCOCK NUCLEAR AND DECOMMISSIONING SERV,BALTIC BUSINESS CENTRE,SALTMEADOWS ROAD, GATESHEAD, TYNE AND WEAR	NE8 1YZ	28/10/1994	N/a	Disposal of radioactive waste (was RSA60 section 6)	
Hartlepool							
AA2747, AB8708	MAGNOX ELECTRIC LTD	HARTLEPOOL POWER STATION,TEES ROAD, HARTLEPOOL, CLEVELAND	TS25 2BZ	N/a	03/12/1991	Disposal of radioactive waste (was RSA60 section 6)	Magnox Ltd is a nuclear decommissioning Site Licence Company (SLC) controlled by Reactor Sites Management Company, its designated Parent Body Organisation (PBO). It operates under contract for the Nuclear Decommissioning Authority, a government body set up

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							specifically to deal with the nuclear legacy under the Energy Act 2004. Magnox used to own the Hartlepool Power Station which is now operated by EDF.
		DISTRICT SURVEY LABORATORY UNIT 9, HUNTER HOUSE ESTATE, TOFTS FARM EAST, HARTLEPOOL, CLEVELAND	TS25 2BE	N/a	02/07/1992	Disposal of radioactive waste (was RSA60 section 6)	See above notes
CE1911	TIOXIDE EUROPE LTD	HUNTSMAN PIGMENTS,GREATHAM WORKS,TEES ROAD, HARTLEPOOL, CLEVELAND	TS25 2DD	22/03/2010	22/03/2010	Disposal of radioactive waste (was RSA60 section 6)	

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AS3528	BRITISH ENERGY GENERATION LTD now EDF	HARTLEPOOL POWER STATION,TEES ROAD, HARTLEPOOL, CLEVELAND	TS25 2BZ	N/a	29/02/1996	Disposal of radioactive waste (was RSA60 section 6)	Operational and still producing LLW - in 2012 they produced around 130 m3 of LLW. The majority of this has low levels of activity (near the bottom end of LLW), and is incinerated. Radioactive waste is produced through normal operation and maintenance of the power station, and the majority is soft trash. They send non combustible waste to the Low Level Waste Repository (LLWR), near Drigg where it is placed into their vaults. They sent one consignment of waste to LLWR in 2012, amounting to 19 m3. The facility is run by LLWR.
Middlesbrough companies							
AW6880,AW6898, BW4873	Ineos. Was BASF Plc	PO Box 62, Seal Sands Middlesbrough	TS2 1TX	N/a	20/12/1996	Disposal of radioactive waste (was RSA60 section 6)	Also see Ineos, School Aycliffe Lane Newton Aycliffe, County Durham

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Newcastle upon Tyne							
AH1960	NATIONAL GRID TRANSCO LTD	QUEEN VICTORIA ROAD, NEWCASTLE UPON TYNE, TYNE AND WEAR	NE1 4LP	N/a	31/03/1991	Keeping and use of radioactive materials (was RSE60 section 1)	Also see Northumberland list for the National Grid compressor station, Milfield, Wooller, Northumberland
North Tyneside							
AU5203	MINISTRY OF AGRICULTURE FISHERIES AND FOOD	VETERINARY INVESTIGATION CENTRE,WHITLEY ROAD,LONGBENTON, NEWCASTLE UPON TYNE	NE12 9SE	N/a	26/04/1996	Disposal of radioactive waste (was RSA60 section 6)	No longer carry out any work that produces LLW.
AC4791	PROCTER AND GAMBLE TECHNICAL CENTRES LIMITED	WHITLEY ROAD,PO BOX: FOREST HALL NO 2, LONGBENTON, NEWCASTLE UPON TYNE, TYNE AND WEAR	NE12 9TS	N/a	31/03/1991	Disposal of radioactive waste (was RSA60 section 6)	Do not produce LLW on site.
BA7786	(STS) RGB Ltd Not RIGBLAST ENERGY SERVICES LTD	HOWDON TERMINAL,WILLINGTON QUAY, WALLSEND, TYNE AND WEAR	NE28 6UL	N/a	16/04/1998	Disposal of radioactive waste (was RSA60 section 6)	STS (Stork Technical Services) have taken over Rigblast. STS are no longer at Howden Terminal, STS is based at Thornaby, TS17 9LT. STS do not produce LLW at Thornaby site, they use it at their Scotland site, but no waste is created.

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BW5233	SWAN HUNTER (TYNESIDE) LTD	WALLSEND SHIPYARD, NEWCASTLE UPON TYNE	NE28 6EQ	N/a	01/12/2003	Disposal of radioactive waste (was RSA60 section 6)	North Tyneside Council now own the land. Swan Hunter staff member advises that they do not produce LLW on site at Wallsend Shipyard.
Northumberland							
AD3812	Rio Tinto. Was Alcan Aluminium UK Ltd	Lynemouth Smelter, Ashington, Northumberland	NE63 9YH	N/a	31/03/1991	N/a	Advised they are decommissioning the site along with Shipham, Northern Blyth site, but that they did have LLW in 2013 (decommissioning waste). Did not produce any radioactive waste between Jan 2012 to Dec 2012.
CA5133	Gilligan Engineering Services	Andrews House, Princess Way, Low Prudhoe Industrial Estate, Prudhoe	NE42 6HB	N/a	12/06/2006	Disposal of radioactive waste (was RSA60 section 6)	
CE0397, AX7423, AX7431	Jonathan Wainwright And Alex Font	Bearl Equine Clinic, Bearl Farm, Bywell, Stocksfield	NE43 7AJ	12/05/1997	18/01/2010	Disposal of radioactive waste (was RSA60 section 6)	

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CA2169, CA2142	National Grid Plc	Wooler Compressor Station, Milfield, Wooler, Nothumberland	NE7 6HD	N/a	28/02/2006	Disposal of radioactive waste (was RSA60 section 6)	
CA4021, AB4672, BK4391, BK5195, BA0994, AY2290, A1889, BG7797, BW5195, AY2290, AD3952, CA4021, BK6360, BK4391, AB4672, CA4153, CE5160, CB1125, CB1109	SANOFI-SYNTHELABO LTD	Sanofi-Aventis, Willowburn Avenue, Alnwick Northumberland	NE66 2JH	N/a	21/04/2006	Keeping and use of radioactive materials (was RSE60 section 1)	Advised that the Willowburn Avenue site is no longer there. They have a manufacturing plant in Fawdon due to close in 2015.
CD1762, CD1819	SCM Pharma Ltd	UNIT 6, REGENTS DRIVE,LOW PRUDHOE INDUSTRIAL ESTATE, PRUDHOE, NORTHUMBERLAND	NE42 6PX	10/12/2008	10/12/2008	Disposal of radioactive waste (was RSA60 section 6)	Do produce LLW at the Unit 6 site. They also have a site in Newburn, Nr. Newcastle but this site does not produce LLW.

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BU4961, BJ1613	Transgenomic Ltd	SOUTH NELSON ROAD,CRAMLINGTON,NORTHUMBERLAND, CRAMLINGTON, NORTHUMBERLAND	NE23 1WF	N/a	14/04/2003	Disposal of radioactive waste (was RSA60 section 6)	
AT7065, BI8862	V Fuels Ltd	Cambois, West Sleekburn, Bedlington Northumberland	NE22 7DB	N/a	15/11/1995	Disposal of radioactive waste (was RSA60 section 6) Keeping and use of radioactive materials (was RSE60 section 1)	
Redcar & Cleveland							
AK9518	CORUS UK LTD	C3 EFFLUENT OUTFALL,CLEVELAND WORKS,PO BOX 29, REDCAR, CLEVELAND	TS10 5RD	N/a	14/03/1994	Disposal of radioactive waste (was RSA60 section 6)	Now Tata Steel.
BA6259		REDCAR SINTER PLANT,STEEL HOUSE, REDCAR, CLEVELAND	TS10 5QW	01/06/1998	01/06/1998	Disposal of radioactive waste (was RSA60 section 6)	Per EA site, 1 day only permit.
AG9728		TEESIDE LABORATORIES,ESTON ROAD, GRANGETOWN, MIDDLESBROUGH,	N/a	N/a	31/03/1991	Disposal of radioactive waste (was RSA60 section 6)	Now Tata Steel.

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		CLEVELAND					
BS4570	CRODA CHEMICALS INTERNATIONAL LTD	CHEMICAL PLANT AREAS,CRODA,WILTON INTERNATIONAL SITE, REDCAR, CLEVELAND	TS10 4RG	N/a	23/08/2002	Keeping and use of radioactive materials (was RSE60 section 1)	Plant closed due to DOW Chemical Company closing closing down.
	DOW (WILTON) LTD	PO BOX 1990,DOW WILTON MAIN OFFICE, WILTON, REDCAR, CLEVELAND	TS10 4YF	06/06/1995	09/12/2003	Disposal of radioactive waste (was RSA60 section 6)	See above notes re Croda Chemicals.
BH9582	DU PONT (UK) LTD	WILTON SITE, MIDDLESBROUGH, CLEVELAND	TS6 8JJ	N/a	26/05/2000	Disposal of radioactive waste (was RSA60 section 6)	Do not produce LLW.
BF4822	ENRON TEESSIDE OPERATIONS LTD	ENRON TEESSIDE OPERATIONS HQ,WILTON SITE, MIDDLESBROUGH, CLEVELAND	TS90 8JA	N/a	12/10/1999	Disposal of radioactive waste (was RSA60 section 6)	This company has gone into liquidation.
BK1902,	BASELL POLYPROPYLENE LTD	PO BOX 5,WILTON INTERNATIONAL, MIDDLESBROUGH, CLEVELAND	TS6 8YU	N/a	29/05/2001	Keeping and use of radioactive materials (was RSE60 section 1)	This company merged to become Basell Polyolefins UK Ltd. Confirmed that this site was closed many years ago.

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AW7118	BASF PLC	NOVOLEN,PO BOX 5,WILTON SITE, MIDDLESBROUGH, CLEVELAND	TS6 8yu	N/a	14/03/1997	Disposal of radioactive waste (was RSA60 section 6)	See above notes on company, Basell Polypropylene Ltd.
AC0958	IMPERIAL CHEMICAL INDUSTRIES PLC	WILTON WORKS, MIDDLESBROUGH, CLEVELAND	TS6 8JE	N/a	31/03/1991	Disposal of radioactive waste (was RSA60 section 6)	ICI is no longer at the Wilton Site.
BX3872	INVISTA TEXTILES (UK) LTD	PO BOX 401,WILTON SITE, MIDDLESBROUGH, CLEVELAND	TS6 8JJ	N/a	07/04/2004	Disposal of radioactive waste (was RSA60 section 6)	
CD7035	Lotte Chemical UK LTd. Was ARTENIUS UK LTD	DAVIES OFFICE,WILTON SITE, MIDDLESBROUGH, CLEVELAND	TS10 4XZ	26/05/2000	28/05/2009	Keeping and use of radioactive materials (was RSE60 section 1)	Advised that the EA permit was taken out specifically for the demolition of a chemical plant. Do not product LLW on site.
BW5055	HUNTSMAN POLYURETHANES (UK) LTD	LITTLEBECK OFFICES,PO BOX 99,WILTON SITE, REDCAR, CLEVELAND	TS10 4YA	14/03/2002	01/12/2003	Disposal of radioactive waste (was RSA60 section 6)	

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BI2338	HUNTSMAN POLYURETHANES (UK) LTD	PO BOX 90, MIDDLESBROUGH, CLEVELAND	TS90 8JE	N/a	01/09/2000	Disposal of radioactive waste (was RSA60 section 6)	
BJ8197	CLEVELAND POTASH LTD	BOULBY MINE, LOFTUS, SALTBURN-BY-THE-SEA, CLEVELAND	TS13 4UZ	N/a	05/01/2001	Keeping and use of radioactive materials (was RSE60 section 1)	Keep radioactive waste equipment on site which has to be changed periodically. Think that the equipment was changed during the last 12 months.
CD6462, cc0833	GDF SUEZ TEESSIDE LTD	TEESSIDE POWER STATION,GREYSTONE ROAD, GRANGETOWN, MIDDLESBROUGH, CLEVELAND	TS6 8JF	01/04/2008	23/09/2009	Disposal of radioactive waste (was RSA60 section 6)	
BZ4390	PX LTD	TEESSIDE POWER STATION,GREYSTONE ROAD, GRANGETOWN, MIDDLESBROUGH, CLEVELAND	TS6 8JF	N/a	19/10/2005	Keeping and use of radioactive materials (was RSE60 section 1)	
CB1559	Sabic UK Petrochemicals ULC	Wilton International Manufacturing Site PO Box 99 Wilton Redcar Cleveland	TS10 4YA	25/01/2002	18/12/2007	Keeping and use of radioactive materials (was RSE60 section 1)	

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CB1567		PO Box 54 Wilton Redcar	TS90 8JA	03/12/2002	03/09/2007	Disposal of radioactive waste (was RSA60 section 6)	
South Tyneside							
BY0798	BLUEWATER SERVICES (UK) LTD	WAGONWAY ROAD, HEBBURN, TYNE AND WEAR	NE31 1SP	N/a	12/07/2004	Disposal of radioactive waste (was RSA60 section 6)	Business did work on a 'refit' on site years ago.
BI9324	IDS LTD	UNIT 10 ,DIDCOT WAY,BOLDON BUSINESS PARK, BOLDON COLLIERY, TYNE AND WEAR	NE35 9PD	31/03/1991	11/08/2000	Disposal of radioactive waste (was RSA60 section 6)	
CA5672	MCNULTY OFFSHORE CONSTRUCTION LTD	A AND P TYNE WAGONWAY ROAD , HEBBURN, TYNE AND WEAR	NE31 1SP	N/a	31/07/2006	Disposal of radioactive waste (was RSA60 section 6)	This company has been dissolved.
AC4805	No DOW. Formerly ROHM AND HAAS (UK) LTD	TYNESIDE WORKS, JARROW, TYNE AND WEAR	NE32 3DJ	N/a	31/03/1991	Disposal of radioactive waste (was RSA60 section 6)	

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Sunderland							
BT4958	MOTHERWELL BRIDGE NUCLEAR LTD	LEECHMERE WORKS,WELLMERE ROAD,LEECHMERE INDUSTRIAL ESTATE, SUNDERLAND	SR2 9TG	N/a	18/11/2002	Accumulation of radioactive waste (was RSA60 section 7)	This company went into receivership some time ago.
Stockton on Tees							
AIR PRODUCTS (CHEMICALS) TEESSIDE LTD	PO BOX 6 TERRA BILLINGHAM SITE,BELASIS AVENUE, BILLINGHAM, CLEVELAND		TS23 4EA				Advised by Head Office that this site has closed down.
Fuji Film (was previously known as AVECIA LTD)	PO BOX 2,BELASIS AVENUE, BILLINGHAM, CLEVELAND						The LLW was due to a laboratory refurbishment. There will not be any further LLW produced by this site.
ZENECA LTD	CHILTERN SITE,PO BOX 2,BELASIS AVE, BILLINGHAM, CLEVELAND	Zeneca Life Science Molecules PO Box 2 Belasis Avenue	TS23 1YN				

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BLYCHEM LTD	PAVILLION 3,BELASIS HALL TECHNOLOGY PARK,BELASIS AVENUE, BILLINGHAM, CLEVELAND	Belasis Court, Greenwood Road, Billingham Cleveland	TS23 4AZ				Produce very small amount of LLW.
BP EXPLORATION OPERATING CO LTD	BP CATS TERMINAL,SEAL SANDS ROAD, MIDDLESBROUGH, CLEVELAND	BP Amoco Cats Terminal, Seal Sands Road, Seal Sands Middlesbrough TS2 1UB Middlesbrough TS2 1UB	TS2 1UB				
CAMBRIDGE RESEARCH BIOCHEMICALS LTD	10 BELASIS COURT,BELASIS HALL TECHNOLOGY PARK, BILLINGHAM, CLEVELAND		TS23 4AZ				They do not produce LLW on site. They have an outside contractor that they use now in Cardiff so any LLW is produced in Cardiff. The permit is from over 12 years ago and from a site that they have now moved.
CLEVELAND MEDICAL LABORATORIES LTD	NATIONAL REFERENCE LABORATORY,LETCH LANE, CARLTON, STOCKTON-ON-TEES, CLEVELAND	Cleveland Medical Laboratories Ltd, Care of E A Clayton Willowbridge, Carlton Stockton-On-Tees Cleveland TS21 1EB.	TS2 1UB				

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CONOCOPHILLIPS PETROLEUM CO UK LTD	TEESSIDE OPERATIONS ,SEAL SANDS, MIDDLESBROUGH, CLEVELAND, Middlesbrough		TS2 1UH				
ELEMENTIS UK LTD	URLAY NOOK, EAGLESCLIFFE, STOCKTON-ON-TEES, CLEVELAND		TS16 0QG				The permit is obsolete. Do not produce any LLW as this is now a non-production site.
Growhow UK Ltd Was previously GROWHOW UK (EAST) LTD	AMMONIA PRODUCTION AREA,PO BOX 81, BILLINGHAM, CLEVELAND		TS23 1PY				
JOHNSON MATTHEY PLC	PAVILION 10, THE MOAT,BELASIS TECHNOLOGY PARK, BILLINGHAM, STOCKTON-ON-TEES	Florence House, Pearson Court, Pearson Way Teesdale Stockton-on-tees, Cleveland TS17 6PS 01642 637000					
	PO BOX 1,BELASIS AVENUE, BILLINGHAM, CLEVELAND	Johnson Matthey Catalysts PO Box 1 Belasis Avenue Billingham Cleveland TS23 1LB UK 01642 553601					

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	TRACERCO, PAVILLION 11,COXWOLD WAY,BELASIS HALL TECHNOLOGY PARK, BILLINGHAM, CLEVELAND						
LUCITE INTERNATIONAL UK LTD	BILLINGHAM SITE, BILLINGHAM, CLEVELAND	Cassel Works, New Road, Billingham, Cleveland TS23 1DE 01642 735000					Do not generate waste on a routine basis. Do have radioactive sources on site. When no longer in use, Traceco deal with their disposal. They have 3 licences for the site for field sources – but none in last 3/4 years and open sources for tracer testing ie. in streams – but not had any waste for the last 5 years. They are looking to replace radioactive with new technology going forward.
NORSE MERCHANT (DM) LTD	EAGLESCLIFFE LOGISTICS CENTRE,EAGLESCLIFFE, STOCKTON-ON-TEES, CLEVELAND						This company went into liquidation.

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PETROPLUS REFINING TEESSIDE LTD	NORTH TEES SITE,SEATON ROAD, PORT CLARENCE, MIDDLESBROUGH	Huntsman Drive, Port Clarence Middlesbrough Cleveland TS2 1TT					Company has gone into liquidation.
QUOTIENT BIORESEARCH (RUSHDEN) LTD	PO BOX 2,BELASIS AVENUE, BILLINGHAM, CLEVELAND						Advised that they no longer have site in Billingham.
SABIC UK PETROCHEMICALS	BOC Ltd NORTH TEES SITE,SEATON ROAD, PORT CLARENCE, MIDDLESBROUGH	Redcar Cleveland TS10 4YA 01642 834622 & PO Box 99 The Wilton Centre Redcar Cleveland TS10 4YR 01642 453366					

1.2. Hospitals

Permission No:	Permission Holder:	Site Address:	Site PostCode:	Original Approved Date:	Approved Date:	RSA Section Definition:	Notes
BZ0688,	County Durham and Darlington Acute Hospitals NHS Trust	Darlington Memorial Hospital, Hollyhurst Road, Darlington, County Durham	DL3 6HX	25/06/2001	01/04/2005	Disposal of radioactive waste (was RSA60 section 6)	Unable to supply data.
AA5851, AD7095, BH6389, CA6032, AS4753	COUNTY DURHAM AND DARLINGTON NHS FOUNDATION TRUST	UNIVERSITY HOSPITAL OF NORTH DURHAM,NORTH ROAD, DURHAM, COUNTY DURHAM	DH1 5TW	31/03/1991	31/03/1991	Disposal of radioactive waste (was RSA60 section 6) KEEPING AND USE OF RADIOACTIVE MATERIALS 9WAS RSA60 SECTION 1)	
AL4996, BR6490	NORTH TEES AND HARTLEPOOL NHS TRUST	UNIVERSITY HOSPITAL OF HARTLEPOOL,HOLDFORTH ROAD, HARTLEPOOL, CLEVELAND	TS24 9AH	N/a & 02/03/2001	23/05/1994 & 09/05/2002	Disposal of radioactive waste (was RSA60 section 6)	
AC0176	NORTH TEES AND HARTLEPOOL NHS TRUST	UNIVERSITY HOSPITAL OF NORTH TEES, HARDWICK ROAD, STOCKTON-ON-TEES, CLEVELAND	TS19 8PE				

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AD3898	COUNTY DURHAM AND DARLINGTIN NHS FOUNDATIONSHOTLEY BROIDGE GENERAL HOSPITAL NHS TRUST	MAIN BUILDING , SHOTLEY BRIDGE, CONSETT, COUNTY DURHAM	DH8 0NB	N/A	31/03/1991	Disposal of radioactive waste (was RSA60 section 6)	Advised that Shotley does not produce any LLW.
BF2455, BZ0025, CC0957, AA5547, BY7237, BW5144, BY9990, CA7217	Gateshead Health NHS Foundation Trust	QUEEN ELIZABETH HOSPITAL,QUEEN ELIZABETH AVENUE, SHERIFF HILL, GATESHEAD, TYNE AND WEAR	NE9 6SX	11/02/1992	04/02/2008	Disposal of radioactive waste (was RSA60 section 6)	Advised cannot supply data.
AC0125	Middlesbrough General Hospital NHS Trust	Ayresome Green Lane, Middlesbrough	TS5 5AZ	N/a	31/03/1991	Disposal of radioactive waste (was RSA60 section 6)	
AC0265, BW4776 AS3854 BZ0670 CA6938 B15744	South Tees Hospitals NHS Trust	James Cook University Hospital, Marton Road, Middlesbrough, Cleveland	TS4 3BW	31/03/1991	31/03/1991	Disposal of radioactive waste (was RSA60 section 6)	
CB3080, AJ3514, BT9429, bu0125, ac0389	NEWCASTLE UPON TYNE HOSPITALS NHS TRUST	NEWCASTLE GENERAL HOSPITAL,WESTGATE ROAD, NEWCASTLE UPON TYNE	NE4 6BE	29/01/1993	22/05/2007	Keeping and use of radioactive materials (was RSE60 section 1)	See the notes below relating to Freeman and the Royal Victoria hospital.

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AC1342	MEDICAL RESEARCH COUNCIL	NEUROCHEMICAL PATHOLOGY UNIT,WESTGATE ROAD, NEWCASTLE UPON TYNE, TYNE AND WEAR	NE4 6BE	N/a	31/03/1991	Disposal of radioactive waste (was RSA60 section 6)	Have available all the data going back 20 years for the North Clinical Waste Consortium, but is not happy to release it to us without the consent of the EA. Advised that the EA demands that there are 2 disposal routes. North Clinical Waste Consortium has 3 disposal routes. All material goes to SRCL in Knowsthrop to 2x incinerator and a storage site. They do not have liquid waste. They have a licence to put all liquids down the drains.
	NEWCASTLE UPON TYNE HOSPITALS NHS TRUST	FREEMAN HOSPITAL Freeman Road High Heaton Newcastle upon Tyne	NE7 7DN				
	THE NEWCASTLE UPON TYNE HOSPITALS NHS FOUNDATION TRUS	ROYAL VICTORIA INFIRMARY,QUEEN VICTORIA ROAD, NEWCASTLE UPON TYNE	NE1 4LP	31/03/1991	27/01/2003	Keeping and use of radioactive materials (was RSE60 section 1)	
AO8025	Northumberland Health Authority	Hexham General Hospital, Hexham, Northumberland	NE46 1QJ	N/a	14/11/1994	Keeping and use of radioactive materials (was RSE60 section 1)	
BU5011	SOUTH TYNESIDE NHS FOUNDATION TRUST	SOUTH TYNESIDE DISTRICT HOSPITAL,HARTON LANE, SOUTH SHIELDS, TYNE AND WEAR	NE34 0PL	31/12/1993	30/04/2003	Disposal of radioactive waste (was RSA60 section 6)	

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AD3936	SUNDERLAND DISTRICT HOSPITAL NHS TRUST	ROYAL INFIRMARY ,NEW DURHAM ROAD , SUNDERLAND	SR4 7TP	N/a	31/03/1991	N/a	
AP4050	NATIONAL HEALTH SERVICE BLOOD AND TRANSPLANT	THE TRANSFUSION CENTRE,HOLLAND DRIVE ,BARRACK ROAD, NEWCASTLE UPON TYNE	NE2 4NQ	N/a	20/01/1995	Disposal of radioactive waste (was RSA60 section 6)	NHS Blood & Transplant at Newcastle no longer generates any liquid or solid radioactive waste.

1.3. Universities

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	UNIVERSITY OF DURHAM	UNIVERSITY OF DURHAM STOCKTON CAMPUS, STOCKTON-ON-TEES, CLEVELAND					
AJ5444, AR6479		SCIENCE LABORATORIES,SOUTH ROAD, DURHAM	DH1 3LE	31/03/1991	25/04/1994	Disposal of radioactive waste (was RSA60 section 6)	
BW5187, AP2669, BY7954, AP2669,AR5570, AC4988		SCIENCE LABORATORIES,SOUTH ROAD, DURHAM	DH1 3LE	31/03/1991	01/12/2003	Disposal of radioactive waste (was RSA60 section 6)	
BJ1567	UNIVERSITY OF NEWCASTLE	DEPT OF BIOLOGICAL ENVIRONMENTAL SCIENCE,FACULTY OF AGRICULTURE,THE UNIVERSITY, NEWCASTLE UPON TYNE, TYNE AND WEAR	NE2 4PT	31/03/1991	23/08/2000	Keeping and use of radioactive materials (was RSE60 section 1)	
BZ6236		UNIVERSITY OF NEWCASTLE,KING GEORGE VI BUILDINGS, NEWCASTLE UPON TYNE	NE1 7RV	31/03/1991	12/10/2005	Disposal of radioactive waste (was RSA60 section 6)	

Permission No:	Permission Holder:	Site Address:	Site PostCode:	Original Approved Date:	Approved Date:	RSA Section Definition:	Notes
BZ3334		CAMPUS FOR AGEING AND VITALITY,NEWCASTLE GENERAL HOSPITAL,WESTGATE ROAD, NEWCASTLE UPON TYNE	NE4 6BE	12/07/2002	12/07/2005	Keeping and use of radioactive materials (was RSE60 section 1)	
BI8751		THE GENETICS INSTITUTE,INTERNATIONAL CENTRE FOR LIFE,TIMES SQUARE, NEWCASTLE UPON TYNE	NE1 4EP	14/08/2000	14/08/2000	Keeping and use of radioactive materials (was RSE60 section 1)	
AC1393	NORTHUMBRIA UNIVERSITY Was Newcastle Polytechnic	ELLISON BUILDING,NORTHUMBRIA UNIVERSITY, NEWCASTLE UPON TYNE, TYNE AND WEAR	NE1 8ST	N/a	31/03/1991	Disposal of radioactive waste (was RSA60 section 6)	
AI7211	UNIVERSITY OF SUNDERLAND	THE LIFE SCIENCES COMPLEX,(FLEMING, PASTEUR, DALE AND DARWIN BUILDINGS),CHESTER ROAD CAMPUS, SUNDERLAND	SR1 3SD	N/a	31/03/1991	Disposal of radioactive waste (was RSA60 section 6)	Surrendered their permit 3 years ago due stopping courses. Their contractor was SRCL at the time.
	Teeside University	Middlesbrough, Tees Valley	TS1 3BA				

2. Radioactive Waste Production & Disposal 2011

Source: Pollution Inventory data to show data from RAS sites in the North East region, North East area for the 2011 reporting year (Environment Agency)

ID	OPERATOR NAME	SITE ADDRESS	SUBSTANCE NAME	ROUTE NAME	QUANTITY RELEASED	UNIT OF MEASURE
BJ4019	NORTH TEES AND HARTLEPOOL NHS TRUST	UNIVERSITY HOSPITAL OF HARTLEPOOL HOLDFORTH ROAD HARTLEPOOL CLEVELAND	Total Beta/Gamma (Excl Tritium)	Transfers - Radioactive Waste Incineration	2	megabecquerels
BJ4019	NORTH TEES AND HARTLEPOOL NHS TRUST	UNIVERSITY HOSPITAL OF HARTLEPOOL HOLDFORTH ROAD HARTLEPOOL CLEVELAND	Iodine 123	Wastewater	3,421	megabecquerels
BJ4019	NORTH TEES AND HARTLEPOOL NHS TRUST	UNIVERSITY HOSPITAL OF HARTLEPOOL HOLDFORTH ROAD HARTLEPOOL CLEVELAND	Technetium 99m	Wastewater	182	gigabecquerels
BJ4019	NORTH TEES AND HARTLEPOOL NHS TRUST	UNIVERSITY HOSPITAL OF HARTLEPOOL HOLDFORTH ROAD HARTLEPOOL CLEVELAND	Selenium 75	Wastewater	11.1	megabecquerels
BJ4019	NORTH TEES AND HARTLEPOOL NHS TRUST	UNIVERSITY HOSPITAL OF HARTLEPOOL HOLDFORTH ROAD HARTLEPOOL CLEVELAND	Chromium 51	Wastewater	567	megabecquerels

ID	OPERATOR NAME	SITE ADDRESS	SUBSTANCE NAME	ROUTE NAME	QUANTITY RELEASED	UNIT OF MEASURE
BJ4019	NORTH TEES AND HARTLEPOOL NHS TRUST	UNIVERSITY HOSPITAL OF HARTLEPOOL HOLDFORTH ROAD HARTLEPOOL CLEVELAND	Total Beta/Gamma (Excl Tritium)	Wastewater	188	gigabecquerels
BJ4019	NORTH TEES AND HARTLEPOOL NHS TRUST	UNIVERSITY HOSPITAL OF HARTLEPOOL HOLDFORTH ROAD HARTLEPOOL CLEVELAND	Iodine 131	Wastewater	2,148	megabecquerels
CE1911	TIOXIDE EUROPE LTD	HUNTSMAN PIGMENTS GREATHAM WORKS TEES ROAD HARTLEPOOL CLEVELAND	Total Alpha	Transfers - Radioactive Waste Disposal near Drigg	1,644	megabecquerels
CE1911	TIOXIDE EUROPE LTD	HUNTSMAN PIGMENTS GREATHAM WORKS TEES ROAD HARTLEPOOL CLEVELAND	Total Beta/Gamma (Excl Tritium)	Transfers - Radioactive Waste Disposal near Drigg	74	megabecquerels
BZ3342	UNIVERSITY OF NEWCASTLE UPON TYNE	CAMPUS FOR AGEING AND VITALITY NEWCASTLE GENERAL HOSPITAL WESTGATE ROAD NEWCASTLE UPON TYNE	Total Beta/Gamma (Excl Tritium)	Wastewater	20.46	gigabecquerels
BZ3342	UNIVERSITY OF NEWCASTLE UPON TYNE	CAMPUS FOR AGEING AND VITALITY NEWCASTLE GENERAL HOSPITAL WESTGATE ROAD NEWCASTLE UPON TYNE	Fluorine 18	Wastewater	20.46	gigabecquerels

ID	OPERATOR NAME	SITE ADDRESS	SUBSTANCE NAME	ROUTE NAME	QUANTITY RELEASED	UNIT OF MEASURE
AC0265	SOUTH TEES HOSPITALS NHS TRUST	JAMES COOK UNIVERSITY HOSPITAL MARTON ROAD MIDDLESBROUGH CLEVELAND	Thallium 201	Wastewater	990	megabecquerels
AC0265	SOUTH TEES HOSPITALS NHS TRUST	JAMES COOK UNIVERSITY HOSPITAL MARTON ROAD MIDDLESBROUGH CLEVELAND	Indium 111	Wastewater	1,000	megabecquerels
AC0265	SOUTH TEES HOSPITALS NHS TRUST	JAMES COOK UNIVERSITY HOSPITAL MARTON ROAD MIDDLESBROUGH CLEVELAND	Phosphorus 32	Wastewater	45	megabecquerels
AC0265	SOUTH TEES HOSPITALS NHS TRUST	JAMES COOK UNIVERSITY HOSPITAL MARTON ROAD MIDDLESBROUGH CLEVELAND	Iodine 123	Wastewater	10,567	megabecquerels
AC0265	SOUTH TEES HOSPITALS NHS TRUST	JAMES COOK UNIVERSITY HOSPITAL MARTON ROAD MIDDLESBROUGH CLEVELAND	Technetium 99m	Wastewater	206,055	megabecquerels
AC0265	SOUTH TEES HOSPITALS NHS TRUST	JAMES COOK UNIVERSITY HOSPITAL MARTON ROAD MIDDLESBROUGH CLEVELAND	Total Beta/Gamma (Excl Tritium)	Transfers - Radioactive Waste Incineration	1	megabecquerels

ID	OPERATOR NAME	SITE ADDRESS	SUBSTANCE NAME	ROUTE NAME	QUANTITY RELEASED	UNIT OF MEASURE
AC0265	SOUTH TEES HOSPITALS NHS TRUST	JAMES COOK UNIVERSITY HOSPITAL MARTON ROAD MIDDLESBROUGH CLEVELAND	Total Beta/Gamma (Excl Tritium)	Wastewater	447,745	megabecquerels
AC0265	SOUTH TEES HOSPITALS NHS TRUST	JAMES COOK UNIVERSITY HOSPITAL MARTON ROAD MIDDLESBROUGH CLEVELAND	Chromium 51	Wastewater	767	megabecquerels
AC0265	SOUTH TEES HOSPITALS NHS TRUST	JAMES COOK UNIVERSITY HOSPITAL MARTON ROAD MIDDLESBROUGH CLEVELAND	Iodine 131	Wastewater	226,971	megabecquerels
AC0265	SOUTH TEES HOSPITALS NHS TRUST	JAMES COOK UNIVERSITY HOSPITAL MARTON ROAD MIDDLESBROUGH CLEVELAND	Strontium 89	Wastewater	1,350	megabecquerels
AC0303	CITY HOSPITALS SUNDERLAND NHS FOUNDATION TRUST	SUNDERLAND ROYAL HOSPITAL SUNDERLAND	Iodine 131	Wastewater	139	megabecquerels
AC0303	CITY HOSPITALS SUNDERLAND NHS FOUNDATION TRUST	SUNDERLAND ROYAL HOSPITAL SUNDERLAND	Total Beta/Gamma (Excl Tritium)	Transfers - Radioactive Waste Incineration	2.9	megabecquerels
AC0303	CITY HOSPITALS SUNDERLAND NHS FOUNDATION TRUST	SUNDERLAND ROYAL HOSPITAL SUNDERLAND	Indium 111	Wastewater	951	megabecquerels
AC0303	CITY HOSPITALS SUNDERLAND NHS FOUNDATION TRUST	SUNDERLAND ROYAL HOSPITAL SUNDERLAND	Iodine 123	Wastewater	10.7	gigabecquerels
AC0303	CITY HOSPITALS SUNDERLAND NHS FOUNDATION TRUST	SUNDERLAND ROYAL HOSPITAL SUNDERLAND	Total Beta/Gamma (Excl Tritium)	Wastewater	355	gigabecquerels

ID	OPERATOR NAME	SITE ADDRESS	SUBSTANCE NAME	ROUTE NAME	QUANTITY RELEASED	UNIT OF MEASURE
AC0303	CITY HOSPITALS SUNDERLAND NHS FOUNDATION TRUST	SUNDERLAND ROYAL HOSPITAL SUNDERLAND	Technetium 99m	Wastewater	339.7	gigabecquerels
AC0303	CITY HOSPITALS SUNDERLAND NHS FOUNDATION TRUST	SUNDERLAND ROYAL HOSPITAL SUNDERLAND	Selenium 75	Wastewater	12.4	megabecquerels
AC0303	CITY HOSPITALS SUNDERLAND NHS FOUNDATION TRUST	SUNDERLAND ROYAL HOSPITAL SUNDERLAND	Chromium 51	Wastewater	92.4	megabecquerels
AC0303	CITY HOSPITALS SUNDERLAND NHS FOUNDATION TRUST	SUNDERLAND ROYAL HOSPITAL SUNDERLAND	Gallium 67	Wastewater	3,587.7	megabecquerels
BK7951	COUNTY DURHAM AND DARLINGTON ACUTE HOSPITALS NHS TRUST	DARLINGTON MEMORIAL HOSPITAL HOLLYHURST ROAD DARLINGTON COUNTY DURHAM	Technetium 99m	Wastewater	161,010	megabecquerels
BK7951	COUNTY DURHAM AND DARLINGTON ACUTE HOSPITALS NHS TRUST	DARLINGTON MEMORIAL HOSPITAL HOLLYHURST ROAD DARLINGTON COUNTY DURHAM	Selenium 75	Wastewater	11.2	megabecquerels
BK7951	COUNTY DURHAM AND DARLINGTON ACUTE HOSPITALS NHS TRUST	DARLINGTON MEMORIAL HOSPITAL HOLLYHURST ROAD DARLINGTON COUNTY DURHAM	Total Beta/Gamma (Excl Tritium)	Transfers - Radioactive Waste Incineration	1.7	megabecquerels
BK7951	COUNTY DURHAM AND DARLINGTON ACUTE HOSPITALS NHS TRUST	DARLINGTON MEMORIAL HOSPITAL HOLLYHURST ROAD DARLINGTON COUNTY DURHAM	Iodine 131	Wastewater	9,350	megabecquerels
BK7951	COUNTY DURHAM AND DARLINGTON ACUTE HOSPITALS NHS TRUST	DARLINGTON MEMORIAL HOSPITAL HOLLYHURST ROAD DARLINGTON	Indium 111	Wastewater	1,540	megabecquerels

ID	OPERATOR NAME	SITE ADDRESS	SUBSTANCE NAME	ROUTE NAME	QUANTITY RELEASED	UNIT OF MEASURE
		COUNTY DURHAM				
BK7951	COUNTY DURHAM AND DARLINGTON ACUTE HOSPITALS NHS TRUST	DARLINGTON MEMORIAL HOSPITAL HOLLYHURST ROAD DARLINGTON COUNTY DURHAM	Iodine 123	Wastewater	4,836	megabecquerels
AC4449	UNIVERSITY OF NEWCASTLE	UNIVERSITY OF NEWCASTLE KING GEORGE VI BUILDINGS NEWCASTLE UPON TYNE	Carbon 14	Wastewater	71.53	megabecquerels
AC4449	UNIVERSITY OF NEWCASTLE	UNIVERSITY OF NEWCASTLE KING GEORGE VI BUILDINGS NEWCASTLE UPON TYNE	Phosphorus 32	Wastewater	1,240	megabecquerels
AC4449	UNIVERSITY OF NEWCASTLE	UNIVERSITY OF NEWCASTLE KING GEORGE VI BUILDINGS NEWCASTLE UPON TYNE	Tritium	Wastewater	1,093	megabecquerels
AC4449	UNIVERSITY OF NEWCASTLE	UNIVERSITY OF NEWCASTLE KING GEORGE VI BUILDINGS NEWCASTLE UPON TYNE	Tritium	Transfers - Radioactive Waste Incineration	11.088	megabecquerels
AC4449	UNIVERSITY OF NEWCASTLE	UNIVERSITY OF NEWCASTLE KING GEORGE VI BUILDINGS NEWCASTLE UPON TYNE	Total Beta/Gamma (Excl Tritium)	Wastewater	1,377.43	megabecquerels
AC4449	UNIVERSITY OF NEWCASTLE	UNIVERSITY OF NEWCASTLE KING GEORGE VI BUILDINGS NEWCASTLE UPON TYNE	Total Beta/Gamma (Excl Tritium)	Transfers - Radioactive Waste Incineration	20.298	megabecquerels
AC4449	UNIVERSITY OF NEWCASTLE	UNIVERSITY OF NEWCASTLE KING GEORGE VI BUILDINGS NEWCASTLE UPON TYNE	Sulphur 35	Wastewater	65.9	megabecquerels
CE4082	LOTTE CHEMICAL UK LIMITED	DAVIES OFFICES WILTON INTERNATIONAL REDCAR	Total Beta/Gamma (Excl Tritium)	Transfers - Radioactive Waste Disposal	4.322	megabecquerels

ID	OPERATOR NAME	SITE ADDRESS	SUBSTANCE NAME	ROUTE NAME	QUANTITY RELEASED	UNIT OF MEASURE
		CLEVELAND		near Drigg		
CD5873	BP EXPLORATION OPERATING CO LTD	BP CATS TERMINAL SEAL SANDS ROAD MIDDLESBROUGH CLEVELAND	Total Beta/Gamma (Excl Tritium)	Transfers - Other Radioactive Waste	440,000	becquerels
CD5873	BP EXPLORATION OPERATING CO LTD	BP CATS TERMINAL SEAL SANDS ROAD MIDDLESBROUGH CLEVELAND	Total Alpha	Transfers - Other Radioactive Waste	440000	becquerels
AD7281	PROCTER AND GAMBLE TECHNICAL CENTRES LIMITED	WHITLEY ROAD PO BOX: FOREST HALL NO 2 LONGBENTON NEWCASTLE UPON TYNE TYNE AND WEAR	Total Beta/Gamma (Excl Tritium)	Transfers - Radioactive Waste Incineration	0.2	megabecquerels
AD7281	PROCTER AND GAMBLE TECHNICAL CENTRES LIMITED	WHITLEY ROAD PO BOX: FOREST HALL NO 2 LONGBENTON NEWCASTLE UPON TYNE TYNE AND WEAR	Tritium	Wastewater	7.4	megabecquerels
AD7281	PROCTER AND GAMBLE TECHNICAL CENTRES LIMITED	WHITLEY ROAD PO BOX: FOREST HALL NO 2 LONGBENTON NEWCASTLE UPON TYNE TYNE AND WEAR	Carbon 14	Wastewater	0.02	megabecquerels
AC4988	UNIVERSITY OF DURHAM	SCIENCE LABORATORIES SOUTH ROAD DURHAM	Total Beta/Gamma (Excl Tritium)	Wastewater	129.4	megabecquerels
AC4988	UNIVERSITY OF DURHAM	SCIENCE LABORATORIES SOUTH ROAD DURHAM	Phosphorus 32	Wastewater	118.3	megabecquerels
AC4988	UNIVERSITY OF DURHAM	SCIENCE LABORATORIES SOUTH ROAD	Tritium	Wastewater	75.5	megabecquerels

ID	OPERATOR NAME	SITE ADDRESS	SUBSTANCE NAME	ROUTE NAME	QUANTITY RELEASED	UNIT OF MEASURE
		DURHAM				
AC4988	UNIVERSITY OF DURHAM	SCIENCE LABORATORIES SOUTH ROAD DURHAM	Sulphur 35	Wastewater	11.1	megabecquerels
AC4988	UNIVERSITY OF DURHAM	SCIENCE LABORATORIES SOUTH ROAD DURHAM	Tritium	Transfers - Radioactive Waste Incineration	80	kilobecquerels
AC4988	UNIVERSITY OF DURHAM	SCIENCE LABORATORIES SOUTH ROAD DURHAM	Total Beta/Gamma (Excl Tritium)	Transfers - Radioactive Waste Incineration	40	kilobecquerels
BI8760	INTERNATIONAL CENTRE FOR LIFE	THE GENETICS INSTITUTE INTERNATIONAL CENTRE FOR LIFE TIMES SQUARE NEWCASTLE UPON TYNE	Phosphorus 32	Wastewater	92.22	megabecquerels
BI8760	INTERNATIONAL CENTRE FOR LIFE	THE GENETICS INSTITUTE INTERNATIONAL CENTRE FOR LIFE TIMES SQUARE NEWCASTLE UPON TYNE	Total Beta/Gamma (Excl Tritium)	Wastewater	109.88	megabecquerels
BI8760	INTERNATIONAL CENTRE FOR LIFE	THE GENETICS INSTITUTE INTERNATIONAL CENTRE FOR LIFE TIMES SQUARE NEWCASTLE UPON TYNE	Sulphur 35	Wastewater	17.66	megabecquerels
BJ4043	NORTH TEES AND HARTLEPOOL NHS TRUST	UNIVERSITY HOSPITAL OF NORTH TEES STOCKTON-ON-TEES CLEVELAND	Iodine 123	Wastewater	743	megabecquerels

ID	OPERATOR NAME	SITE ADDRESS	SUBSTANCE NAME	ROUTE NAME	QUANTITY RELEASED	UNIT OF MEASURE
BJ4043	NORTH TEES AND HARTLEPOOL NHS TRUST	UNIVERSITY HOSPITAL OF NORTH TEES STOCKTON-ON-TEES CLEVELAND	Indium 111	Wastewater	177	megabecquerels
BJ4043	NORTH TEES AND HARTLEPOOL NHS TRUST	UNIVERSITY HOSPITAL OF NORTH TEES STOCKTON-ON-TEES CLEVELAND	Technetium 99m	Wastewater	262	gigabecquerels
BJ4043	NORTH TEES AND HARTLEPOOL NHS TRUST	UNIVERSITY HOSPITAL OF NORTH TEES STOCKTON-ON-TEES CLEVELAND	Iodine 131	Wastewater	4,164	megabecquerels
BJ4043	NORTH TEES AND HARTLEPOOL NHS TRUST	UNIVERSITY HOSPITAL OF NORTH TEES STOCKTON-ON-TEES CLEVELAND	Selenium 75	Wastewater	27.9	megabecquerels
BJ4043	NORTH TEES AND HARTLEPOOL NHS TRUST	UNIVERSITY HOSPITAL OF NORTH TEES STOCKTON-ON-TEES CLEVELAND	Total Beta/Gamma (Excl Tritium)	Wastewater	267	gigabecquerels
AJ8311	SOUTH TYNESIDE NHS FOUNDATION TRUST	SOUTH TYNESIDE DISTRICT HOSPITAL HARTON LANE SOUTH SHIELDS TYNE AND WEAR	Gallium 67	Wastewater	320,000,000	becquerels
AJ8311	SOUTH TYNESIDE NHS FOUNDATION TRUST	SOUTH TYNESIDE DISTRICT HOSPITAL	Iodine 131	Wastewater	3,200,000,000	becquerels

ID	OPERATOR NAME	SITE ADDRESS	SUBSTANCE NAME	ROUTE NAME	QUANTITY RELEASED	UNIT OF MEASURE
		HARTON LANE SOUTH SHIELDS TYNE AND WEAR				
AJ8311	SOUTH TYNESIDE NHS FOUNDATION TRUST	SOUTH TYNESIDE DISTRICT HOSPITAL HARTON LANE SOUTH SHIELDS TYNE AND WEAR	Selenium 75	Wastewater	14,000,000	becquerels
AJ8311	SOUTH TYNESIDE NHS FOUNDATION TRUST	SOUTH TYNESIDE DISTRICT HOSPITAL HARTON LANE SOUTH SHIELDS TYNE AND WEAR	Technetium 99m	Wastewater	260,000,000	kilobecquerels
AJ8311	SOUTH TYNESIDE NHS FOUNDATION TRUST	SOUTH TYNESIDE DISTRICT HOSPITAL HARTON LANE SOUTH SHIELDS TYNE AND WEAR	Total Beta/Gamma (Excl Tritium)	Wastewater	270,000,000	kilobecquerels
VP3693	COVANCE LABORATORIES LTD	SANOFI-AVENTIS WILLOWBURN AVENUE ALNWICK NORTHUMBERLAND	Total Beta/Gamma (Excl Tritium)	Transfers - Radioactive Waste Incineration	35,795	megabecquerels
VP3693	COVANCE LABORATORIES LTD	SANOFI-AVENTIS WILLOWBURN AVENUE ALNWICK NORTHUMBERLAND	Carbon 14	Air	1,434	megabecquerels
VP3693	COVANCE LABORATORIES LTD	SANOFI-AVENTIS WILLOWBURN AVENUE ALNWICK NORTHUMBERLAND	Carbon 14	Wastewater	16,167	megabecquerels
AC1172	IDS LTD	UNIT 10 DIDCOT WAY	Iodine 125	Wastewater	24,048	megabecquerels

ID	OPERATOR NAME	SITE ADDRESS	SUBSTANCE NAME	ROUTE NAME	QUANTITY RELEASED	UNIT OF MEASURE
		BOLDON BUSINESS PARK BOLDON COLLIERY TYNE AND WEAR				
AC1172	IDS LTD	UNIT 10 DIDCOT WAY BOLDON BUSINESS PARK BOLDON COLLIERY TYNE AND WEAR	Total Beta/Gamma (Excl Tritium)	Transfers - Radioactive Waste Incineration	41	megabecquerels
CD1762	SCM PHARMA LTD	UNIT 6, REGENTS DRIVE LOW PRUDHOE INDUSTRIAL ESTATE PRUDHOE NORTHUMBERLAND	Total Beta/Gamma (Excl Tritium)	Transfers - Radioactive Waste Incineration	199.28	megabecquerels
AC0389	THE NEWCASTLE UPON TYNE HOSPITALS NHS FOUNDATION TRUST	QUEEN VICTORIA ROAD NEWCASTLE UPON TYNE TYNE AND WEAR	Technetium 99m	Wastewater	330,597	megabecquerels
AC0389	THE NEWCASTLE UPON TYNE HOSPITALS NHS FOUNDATION TRUST	QUEEN VICTORIA ROAD NEWCASTLE UPON TYNE TYNE AND WEAR	Other Beta/Gamma	Wastewater	374	megabecquerels
AC0389	THE NEWCASTLE UPON TYNE HOSPITALS NHS FOUNDATION TRUST	QUEEN VICTORIA ROAD NEWCASTLE UPON TYNE TYNE AND WEAR	Iodine 125	Wastewater	78	megabecquerels
AC0389	THE NEWCASTLE UPON TYNE HOSPITALS NHS FOUNDATION TRUST	QUEEN VICTORIA ROAD NEWCASTLE UPON TYNE TYNE AND WEAR	Tritium	Wastewater	83	megabecquerels
AC0389	THE NEWCASTLE UPON TYNE HOSPITALS NHS FOUNDATION TRUST	QUEEN VICTORIA ROAD NEWCASTLE UPON TYNE TYNE AND WEAR	Iodine 123	Wastewater	29,552	megabecquerels
AC0389	THE NEWCASTLE UPON TYNE HOSPITALS NHS FOUNDATION TRUST	QUEEN VICTORIA ROAD NEWCASTLE UPON TYNE TYNE AND WEAR	Selenium 75	Wastewater	8.5	megabecquerels
AC0389	THE NEWCASTLE UPON TYNE	QUEEN VICTORIA ROAD	Indium 111	Wastewater	8,403	megabecquerels

ID	OPERATOR NAME	SITE ADDRESS	SUBSTANCE NAME	ROUTE NAME	QUANTITY RELEASED	UNIT OF MEASURE
	HOSPITALS NHS FOUNDATION TRUST	NEWCASTLE UPON TYNE TYNE AND WEAR				
AC0389	THE NEWCASTLE UPON TYNE HOSPITALS NHS FOUNDATION TRUST	QUEEN VICTORIA ROAD NEWCASTLE UPON TYNE TYNE AND WEAR	Chromium 51	Wastewater	561	megabecquerels
AC0389	THE NEWCASTLE UPON TYNE HOSPITALS NHS FOUNDATION TRUST	QUEEN VICTORIA ROAD NEWCASTLE UPON TYNE TYNE AND WEAR	Total Beta/Gamma (Excl Tritium)	Wastewater	369,657	megabecquerels
AC0389	THE NEWCASTLE UPON TYNE HOSPITALS NHS FOUNDATION TRUST	QUEEN VICTORIA ROAD NEWCASTLE UPON TYNE TYNE AND WEAR	Tritium	Transfers - Radioactive Waste Incineration	15	megabecquerels
AC0389	THE NEWCASTLE UPON TYNE HOSPITALS NHS FOUNDATION TRUST	QUEEN VICTORIA ROAD NEWCASTLE UPON TYNE TYNE AND WEAR	Total Beta/Gamma (Excl Tritium)	Transfers - Radioactive Waste Incineration	1,943	megabecquerels
AC0389	THE NEWCASTLE UPON TYNE HOSPITALS NHS FOUNDATION TRUST	QUEEN VICTORIA ROAD NEWCASTLE UPON TYNE TYNE AND WEAR	Iodine 131	Wastewater	84	megabecquerels
AW6642	BLYCHEM LTD	PAVILLION 3 BELASIS HALL TECHNOLOGY PARK BELASIS AVENUE BILLINGHAM CLEVELAND	Carbon 14	Air	19.59	gigabecquerels
AW6642	BLYCHEM LTD	PAVILLION 3 BELASIS HALL TECHNOLOGY PARK BELASIS AVENUE BILLINGHAM CLEVELAND	Carbon 14	Wastewater	205.65	gigabecquerels
AO4593	DOOSAN BABCOCK ENERGY	MITSUI BABCOCK NUCLEAR AND	Total Beta/Gamma	Transfers -	2.474	gigabecquerels

ID	OPERATOR NAME	SITE ADDRESS	SUBSTANCE NAME	ROUTE NAME	QUANTITY RELEASED	UNIT OF MEASURE
	LTD	DECOMMISSIONING SERV BALTIC BUSINESS CENTRE SALTMEADOWS ROAD GATESHEAD TYNE AND WEAR	(Excl Tritium)	Radioactive Waste Incineration		
AO4593	DOOSAN BABCOCK ENERGY LTD	MITSUI BABCOCK NUCLEAR AND DECOMMISSIONING SERV BALTIC BUSINESS CENTRE SALTMEADOWS ROAD GATESHEAD TYNE AND WEAR	Total Alpha	Transfers - Radioactive Waste Incineration	6.013	gigabecquerels
AD7095	COUNTY DURHAM AND DARLINGTON NHS FOUNDATION TRUST	UNIVERSITY HOSPITAL OF NORTH DURHAM NORTH ROAD DURHAM COUNTY DURHAM	Technetium 99m	Wastewater	271	gigabecquerels
AD7095	COUNTY DURHAM AND DARLINGTON NHS FOUNDATION TRUST	UNIVERSITY HOSPITAL OF NORTH DURHAM NORTH ROAD DURHAM COUNTY DURHAM	Iodine 131	Wastewater	7.5	gigabecquerels
AD7095	COUNTY DURHAM AND DARLINGTON NHS FOUNDATION TRUST	UNIVERSITY HOSPITAL OF NORTH DURHAM NORTH ROAD DURHAM COUNTY DURHAM	Total Beta/Gamma (Excl Tritium)	Transfers - Radioactive Waste Incineration	4	megabecquerels
AD7095	COUNTY DURHAM AND DARLINGTON NHS FOUNDATION TRUST	UNIVERSITY HOSPITAL OF NORTH DURHAM NORTH ROAD DURHAM COUNTY DURHAM	Iodine 123	Wastewater	6.4	gigabecquerels

ID	OPERATOR NAME	SITE ADDRESS	SUBSTANCE NAME	ROUTE NAME	QUANTITY RELEASED	UNIT OF MEASURE
AD7095	COUNTY DURHAM AND DARLINGTON NHS FOUNDATION TRUST	UNIVERSITY HOSPITAL OF NORTH DURHAM NORTH ROAD DURHAM COUNTY DURHAM	Chromium 51	Wastewater	8.4	megabecquerels
AD7095	COUNTY DURHAM AND DARLINGTON NHS FOUNDATION TRUST	UNIVERSITY HOSPITAL OF NORTH DURHAM NORTH ROAD DURHAM COUNTY DURHAM	Selenium 75	Wastewater	15.2	megabecquerels
AD7095	COUNTY DURHAM AND DARLINGTON NHS FOUNDATION TRUST	UNIVERSITY HOSPITAL OF NORTH DURHAM NORTH ROAD DURHAM COUNTY DURHAM	Iodine 125	Wastewater	0.2	megabecquerels
AC0044	NEWCASTLE UPON TYNE HOSPITALS NHS TRUST (FREEMAN HOSPITAL)	FREEMAN HOSPITAL FREEMAN ROAD HIGH HEATON NEWCASTLE UPON TYNE	Strontium 89	Wastewater	300	megabecquerels
AC0044	NEWCASTLE UPON TYNE HOSPITALS NHS TRUST (FREEMAN HOSPITAL)	FREEMAN HOSPITAL FREEMAN ROAD HIGH HEATON NEWCASTLE UPON TYNE	Tritium	Wastewater	10	megabecquerels
AC0044	NEWCASTLE UPON TYNE HOSPITALS NHS TRUST (FREEMAN HOSPITAL)	FREEMAN HOSPITAL FREEMAN ROAD HIGH HEATON NEWCASTLE UPON TYNE	Iodine 131	Wastewater	290	gigabecquerels
AC0044	NEWCASTLE UPON TYNE HOSPITALS NHS TRUST (FREEMAN HOSPITAL)	FREEMAN HOSPITAL FREEMAN ROAD HIGH HEATON NEWCASTLE UPON TYNE	Samarium 153	Wastewater	2	gigabecquerels

ID	OPERATOR NAME	SITE ADDRESS	SUBSTANCE NAME	ROUTE NAME	QUANTITY RELEASED	UNIT OF MEASURE
AC0044	NEWCASTLE UPON TYNE HOSPITALS NHS TRUST (FREEMAN HOSPITAL)	FREEMAN HOSPITAL FREEMAN ROAD HIGH HEATON NEWCASTLE UPON TYNE	Yttrium 90	Wastewater	185	megabecquerels
AC0044	NEWCASTLE UPON TYNE HOSPITALS NHS TRUST (FREEMAN HOSPITAL)	FREEMAN HOSPITAL FREEMAN ROAD HIGH HEATON NEWCASTLE UPON TYNE	Indium 111	Wastewater	1.3	gigabecquerels
AC0044	NEWCASTLE UPON TYNE HOSPITALS NHS TRUST (FREEMAN HOSPITAL)	FREEMAN HOSPITAL FREEMAN ROAD HIGH HEATON NEWCASTLE UPON TYNE	Chromium 51	Wastewater	2.5	gigabecquerels
AC0044	NEWCASTLE UPON TYNE HOSPITALS NHS TRUST (FREEMAN HOSPITAL)	FREEMAN HOSPITAL FREEMAN ROAD HIGH HEATON NEWCASTLE UPON TYNE	Total Beta/Gamma (Excl Tritium)	Transfers - Radioactive Waste Incineration	18.3	megabecquerels
AC0044	NEWCASTLE UPON TYNE HOSPITALS NHS TRUST (FREEMAN HOSPITAL)	FREEMAN HOSPITAL FREEMAN ROAD HIGH HEATON NEWCASTLE UPON TYNE	Phosphorus 32	Wastewater	19	megabecquerels
AC0044	NEWCASTLE UPON TYNE HOSPITALS NHS TRUST (FREEMAN HOSPITAL)	FREEMAN HOSPITAL FREEMAN ROAD HIGH HEATON NEWCASTLE UPON TYNE	Iodine 123	Wastewater	7	gigabecquerels
AC0044	NEWCASTLE UPON TYNE HOSPITALS NHS TRUST (FREEMAN HOSPITAL)	FREEMAN HOSPITAL FREEMAN ROAD HIGH HEATON NEWCASTLE UPON TYNE	Technetium 99m	Wastewater	617	gigabecquerels
AC0044	NEWCASTLE UPON TYNE HOSPITALS NHS TRUST (FREEMAN HOSPITAL)	FREEMAN HOSPITAL FREEMAN ROAD HIGH HEATON NEWCASTLE UPON TYNE	Selenium 75	Wastewater	12	megabecquerels

ID	OPERATOR NAME	SITE ADDRESS	SUBSTANCE NAME	ROUTE NAME	QUANTITY RELEASED	UNIT OF MEASURE
AC0044	NEWCASTLE UPON TYNE HOSPITALS NHS TRUST (FREEMAN HOSPITAL)	FREEMAN HOSPITAL FREEMAN ROAD HIGH HEATON NEWCASTLE UPON TYNE	Total Beta/Gamma (Excl Tritium)	Wastewater	920	gigabecquerels

3. UK Clinical and Hazardous Waste Incinerators

Operator Name	Installation Name	Planning Region	Planning Sub-Region	Type	Permitted Capacity (tonnage)	Tonnage Incinerated in 2011
DEFRA	Veterinary Laboratories Agency, Surrey	South East	Surrey	Clinical	5,200	1,087
Sita UK Ltd	Wrexham	Wales	North Wales	Clinical	6,000	4,652
S Grundon (Waste) Ltd	Colnbrook, Slough	South East	Berkshire	Clinical	10,000	5,193
SRCL Ltd	Ipswich	East of England	Suffolk	Clinical	8,500	7,884
SRCL Ltd	Nottingham	East Midlands	Nottinghamshire	Clinical	6,500	5,640
Sita UK Ltd	Alexandra Hospital, Redditch	West Midlands	Worcestershire	Clinical	10,000	7,911
SRCL Ltd	Hillingdon Hospital, London	London	West London	Clinical	8,000	7,373
SRCL Ltd	Royal Bournemouth Hospital, Bournemouth	South West	Dorset	Clinical	8,000	6,764
Ethos Recycling Ltd	Bristol	South West	West of England Unitaries	Clinical	8,000	0
SRCL Ltd	Pontefract Hospital, West Yorkshire	Yorkshire & the Humber	West Yorkshire	Clinical	4,500	0
SRCL Ltd	Ashford, Kent	South East	Kent	Clinical	8,500	7,225
SRCL Ltd	Queen Mary's Hospital, Sidcup	South East	Kent	Clinical	8,000	6,807
Health Protection Agency	Centre for Emergency Preparedness, Wiltshire	South West	Wiltshire	Clinical	312	120
Viridor Waste Management Limited	Derriford Hospital, Derriford	South West	Devon	Clinical	4,270	3,548
Cambridge University Hospital NHS Foundation Trust	Addenbrooke's Hospital, Cambridge	East of England	Cambridgeshire	Clinical	4,500	2,551
SRCL Ltd	Knostrop Treatment Works, Leeds	Yorkshire & the Humber	West Yorkshire	Clinical	17,000	15,054

Operator Name	Installation Name	Planning Region	Planning Sub-Region	Type	Permitted Capacity (tonnage)	Tonnage Incinerated in 2011
London Waste Ltd	Edmonton	London	North London	Clinical	75,000	5,762
The Royal Wolverhampton Hospitals NHS Trust	New Cross Hospital, Wolverhampton	West Midlands	West Midlands Met Districts	Clinical	2,500	1,318
Peake (GB) Ltd	Pengover, Cornwall	South West	Cornwall	Clinical	5,241	3,754
SRCL Ltd	Bolton	North West	Greater Manchester	Clinical	6,000	5,474
SITA	Salford	North West	Greater Manchester	Clinical	8,000	6,428
SRCL Ltd	Oldham	North West	Greater Manchester	Clinical	6,570	6,629
JBR Recovery Limited	West Bromwich	West Midlands	West Midlands Met Districts	Hazardous	No specified limit	4,494
Solvent Resource Management Ltd	Morecambe	North West	Lancashire	Hazardous	15,000	1,093
Robinson Brothers	West Bromwich	West Midlands	West Midlands Met Districts	Hazardous	6,880	2,093
Veolia ES Cleanaway (UK) Limited	Ellesmere Port, Wirral	North West	Cheshire	Hazardous	100,000	90,847
DSTL Limited	Porton Down, Wiltshire	South West	Wiltshire	Hazardous	3,045	no data
Tradebe Fawley Limited	Hythe, Southampton	South East	Hampshire	Hazardous	45,000	31,970
Solvent Resource Management Ltd	Rye	South East	Kent	Hazardous	31,250	1,121
Pack2Pack UK Ltd	Avonmouth, Bristol	South West	West of England Unitaries	Hazardous	9,000	4,677

(Source: Environment Agency)

4. Glossary

Activity

The number of atoms of a radioactive substance which decay by nuclear disintegration each second. The unit of activity is the Becquerel, which is equivalent to one disintegration per second.

Becquerel (Bq)

The standard international unit of radioactivity equal to one radioactive transformation per second. Becquerels are abbreviated to Bq. LLW is classified according to its radioactivity content per unit mass of waste (Bq per gram, or per tonne). Multiples of becquerels commonly used to define radioactive waste are: kilobecquerels (kBq) equal to one thousand Bq; megabecquerels (MBq) equal to one million Bq; gigabecquerels (GBq) equal to one thousand million Bq.

Controlled burial

Also known as "special precautions burial". A process of disposal for solid LLW that has an activity level above that which would allow it to be disposed of as VLLW. Controlled burial takes place at landfill sites used for the deposit of substantial quantities of ordinary refuse but which are approved for the disposal of radioactive substances. Controlled burial has various limitations placed on its use in terms of maximum activity per waste container, type of container, surface dose rate of container, and depth of burial beneath earth or ordinary waste.

Decommissioning

The process whereby a nuclear facility, at the end of its economic life, is taken permanently out of service and its site made available for other purposes.

Final Disposal

In the context of solid waste, disposal is the emplacement of waste in a suitable facility without intent to retrieve it at a later date; retrieval may be possible but, if intended, the appropriate term is storage. Disposal may also refer to the release of airborne or liquid wastes to the environment (i.e. emissions and discharges) as well as landfill and incineration.

Ionising Radiations Regulations 1999 (IRR99)

The main legal requirements, enforced by the HSE, concerning the control of exposure to radiation arising from the use of radioactive materials and radiation generators in work activities in the nuclear industry; medical and dental practice; manufacturing; construction; engineering; paper; offshore drilling; education (colleges, schools) and non-destructive testing.

Landfill

The disposal of waste by shallow burial. Modern landfills are lined to reduce seepage of material from the site into the environment, and once full, are capped to reduce rainfall entering the site. The EU Directive on the landfill of waste (Council Directive 99/31/EC) set targets for the reduction of biodegradable municipal waste sent to landfill.

Low Level Waste (LLW)

Includes metals, soil, building rubble and organic materials, which arise principally as lightly contaminated miscellaneous scrap. Metals are mostly in the form of redundant equipment. Organic materials are mainly in the form of paper towels, clothing and laboratory equipment that have been used in areas where radioactive materials are used – such as hospitals, research establishments and industry. LLW contains radioactive materials other than those acceptable for disposal with municipal and general commercial or industrial waste. It is now defined as "radioactive waste having a radioactive content not exceeding four gigabecquerels per tonne (GBq/te) of alpha or 12 GBq/te of beta/gamma radioactivity".

Taking account of the level of risk that they could involve to a member of the public, wastes which fall within Low Level Waste can be subdivided into :-

- **"Out of scope"** wastes. Regulation of these wastes is not considered to be necessary under radioactive substances legislation (the Radioactive Substances Act 1993 and the Environmental Permitting Regulations 2010). This is because their radioactivity levels are so low.

  "Out of scope wastes" also include materials and wastes containing radionuclides which are not amenable to controls because of their ubiquitous presence in the earth, its waters or atmosphere. "Out of scope" equates to "not radioactive" for the purposes of the radioactive substances legislation and they can be managed or disposed of without reference to that legislation. These wastes are not relevant to this appeal except to the extent that they reduce the inventory of LLW.

- **"Exempt"** wastes. Only "light touch" regulation of these wastes is considered to be necessary under radioactive substances legislation. They have activity levels above the "out of scope" levels but below 0.4 Becquerels/gram (Bq/g).

  These are wastes that are defined as radioactive but for which the regulatory body has determined that they need not be subject to some or all aspects of radioactive substances regulatory control. Numerical levels for maximum quantities and concentrations of specific radionuclides are included in the legislation.

  The management or disposal of these wastes is "exempt" from the radioactive waste provisions of the Environmental Permitting Regulations and this widens the potential options that are available.

- **Low Activity Low Level Wastes (LALLW)**. These are wastes with activity levels between 0.4 and 200 Bq/g, which could potentially be disposed of in conventional non-inert landfills. They include **Very Low level Wastes** (VLLW) which have activity levels between 0.4 and 4 Bq/g.

  The regulatory bodies differentiate between Low Volume VLLW (not exceeding 50m^3/ year) sometimes referred to as "dustbin loads", for which a receiving site does not need a disposal authorisation under radioactive substances legislation, and High Volume VLLW for which a radioactive substances legislation disposal authorisation is needed.

- **High Activity Low Level Wastes (HALLW).** These are wastes with activity levels above 200 Bq/g (up to 4000 Bq/g of alpha and 12000 Bq/g of beta/gamma activity) that generally require dedicated highly engineered containment facilities such as those provided by the existing Vault 9 at the Low Level Waste Repository. These wastes are subject to radioactive substances legislation. The appeal proposals include the disposal of wastes up to 500 Bq/g ie that fall within the lower end of HALLW.

Low Level Waste Repository (LLWR) near Drigg
The LLWR is in Cumbria and has operated as a national LLW disposal facility since 1959. Wastes are compacted and placed in containers before being transferred to the facility. Following a major upgrade of disposal operations in 1995, all LLW is now disposed of in engineered concrete vaults. The LLWR near Drigg is owned by the NDA and currently operated by a consortium of companies called UKNWM.

Nuclear Decommissioning Authority (NDA)
The NDA was set up on 1 April 2005, under the Energy Act 2004. It is a non-departmental public body with designated responsibility for managing the liabilities at specific sites. These sites are operated under contract by site licensee companies. The NDA has a statutory requirement under the Energy Act 2004, to publish and consult on its Strategy and Annual Plans, which have to be agreed by the Secretary of State and the Scottish Ministers.

Radioactive waste
Any material contaminated by or incorporating radioactivity above certain thresholds defined in legislation, and for which no further use is envisaged, is known as radioactive waste. (See RSA93 and NIA65.)

Very low level waste (VLLW)
Covers waste with very low concentrations of radioactivity. It arises from a variety of sources, including hospitals and the wider non-nuclear industry. Because VLLW contains little total radioactivity, it has been safely treated by various means, such as disposal with municipal and general commercial and industrial waste directly at landfill sites or indirectly after incineration. Its formal definition is:

(a) in the case of low volumes ('dustbin loads') of VLLW "Radioactive waste which can be safely disposed of to an unspecified destination with municipal, commercial or industrial waste ("dustbin" disposal), each 0.1m3 of waste containing less than 400 kilobecquerels (kBq) of total activity or single items containing less than 40 kBq of total activity. For wastes containing carbon-14 or hydrogen-3 (tritium):

- In each 0.1m3, the activity limit is 4,000 kBq for carbon-14 and hydrogen-3 (tritium) taken together
- For any single item, the activity limit is 400 kBq for carbon-14 and hydrogen-3 (tritium) taken together

Controls on disposal of this material, after removal from the premises where the wastes arose, are not necessary."

Or:

(b) in the case of high volumes of VLLW "Radioactive waste with maximum concentrations of four megabecquerels per tonne (MBq/te) of total activity which can be disposed of to specified landfill sites. For waste containing hydrogen-3 (tritium), the concentration limit for tritium is 40 MBq/te. Controls on disposal of this material, after removal from the premises where the wastes arose, will be necessary in a manner specified by the environmental regulators"

Waste producer

The organisation that produced radioactive waste in the first instance. The waste producer may or may not equate to the current waste manager, as responsibility for the waste may have been passed to another organisation in the interim.

(From a number of sources including: UK Strategy for the Management of Solid Low Level Radioactive Waste from the Nuclear Industry: UK Nuclear Industry LLW Strategy Consultation Document – NDA, June 2009)