

# LLW Topical Strategies Summary

## Introduction

Radioactive waste management can be divided into a number of specific aspects or topics. For each topic a strategy or strategic direction can be defined (known as a 'Topical Strategy') to achieve the NDA's strategic objectives. UK Nuclear Waste Management (UKNWM) Ltd. undertook a Preliminary Strategic Review as part of preparation of the LLW Repository (LLWR) tender in 2006.

This review included a detailed analysis of the Low Level Waste (LLW) inventory up to 2129 and identified a number of potential opportunities to improve LLW management across the UK resulting in extension of the lifetime of the LLWR and reductions in overall liability cost to NDA.

From these opportunities, a number of preliminary LLW Topical Strategies have been developed to initiate the consultation process between consignor sites, regulators, and numerous stakeholders involved with or affected by LLW management. The Topical Strategies set out potential strategic approaches to improve the application of the waste management hierarchy, waste packaging, transportation and inventory management. This note summarises these Topical Strategies and the next stages of development to inform the Nuclear Industry LLW Strategy.

## LLW Topical Strategies

### ***Application of the Waste Management Hierarchy***

Government LLW Policy requires that the principles of the waste hierarchy are applied to LLW.

For LLW this is defined in the Policy as:

- not creating waste where practicable ('avoidance');
- reducing waste arisings (both by activity and by mass) to the minimum through the appropriate design and operation of processes and equipment and making effective use of techniques such as waste characterisation, sorting and segregation, volume reduction and surface contamination removal;
- otherwise minimising quantities of LLW requiring disposal through decay storage, re-use and/or recycling, and incineration (under appropriately regulated circumstances);
- disposal (which may, for some waste forms, include incineration).

A strategic approach has been developed according to the various steps in the hierarchy with the objective that waste should be dealt with at the highest practicable level of this hierarchy.

### **Waste Avoidance/Minimisation**

To improve performance in waste avoidance and minimisation, the National LLW Strategy Group will be used as a mechanism for consignors to share experiences and provide examples of best practice and potentially move towards standardisation of practices across the industry.

### **Waste Characterisation**

Correct and accurate waste characterisation coupled with monitoring and sentencing facilitates optimal application of the waste management hierarchy. Waste characterisation practices and intensity differ significantly across the nuclear industry. Therefore there may be a move towards more standardised methods, techniques and procedures for waste stream segregation and characterisation, and waste package characterisation.

### **Waste Segregation/Categorisation**

Waste segregation is a key enabler for implementation of the waste hierarchy and the utilisation of more fit-for-purpose management, treatment, and disposal routes. Historically UK waste has only been segregated to a limited extent, for example, into compactable/non-compactable. The more waste can be segregated by material type (e.g. metals, combustibles, concrete, compactable, non-compactable, etc) and activity (e.g. Exempt Waste, Very Low Level Waste (VLLW), LLW) the more management options are potentially available.

Standardised methods, techniques, and procedures for waste stream segregation at or near source will be discussed within the National LLW Strategy Group. The LLWR will work with consignors to develop and implement standardised requirements and methodologies for waste segregation and categorisation to optimise downstream waste management activities. There may also be changes to the LLWR Conditions for Acceptance (CFAs) and pricing system to appropriately incentivise consignor behaviour.

### **Waste Treatment**

Waste treatment includes a wide range of processes to reduce the volume of waste requiring disposal by changing the physical form of the waste or by removing surface contamination. This will involve processes such as grit-blasting, incineration, compaction and metal melting.

The LLWR will work with the supply chain to evaluate all available commercial treatment capacity and capability, and open avenues to existing waste treatment capacity. A review will be undertaken on how best to exploit (and potentially expand) the current capacity at UK commercial facilities, NDA sites, and overseas facilities to ensure optimal integration of treatment activities to reduce cost/volume. This could involve use of overseas facilities in the short-term, where appropriate, to mitigate the LLWR capacity pressures whilst developing the business case for the construction of similar facilities in the UK.

### **Re-use/Recycle**

The Government Policy recognises that there are opportunities for industry-wide initiatives for increased re-use and recycling of some forms of LLW particularly material such as metals, decommissioning rubble, and soils.



The National LLW Strategy Group will be used as a forum to identify candidate waste materials that could potentially be reused or recycled within the industry on an existing site or further afield. This could then be matched up with sites that have a demand for such materials, for example, reclaimed aggregate to be used in new concrete construction on another NDA site. Optimising the decommissioning processes to recover and recycle resources for new construction genuinely supports sustainability as it not only reduces the disposal requirements but offsets the cost and environmental impact of new materials. The LLWR will develop a more integrated approach to management of metal wastes that optimises the application of technologies for reuse, decontamination and recycling.

### **Waste Disposal (Exempt/VLLW/LLW)**

The policy requires NDA to consider the optimal use of the existing LLWR near Drigg in Cumbria, recognising the potential uncertainties associated with the site's future capacity. NDA must also consider if, and at what point, any replacement facility or facilities may be

required and the relative benefits of national, regional and local approaches to disposal.

The current “one-size-fits-all” LLW disposal practice at the LLWR results in costly disposal of large quantities of wastes that often do not require the engineered confinement of vault disposal. To this end, the Government LLW policy specifically permits consideration of disposal of high-volume VLLW to specified landfills. The introduction of this disposal outlet for VLLW represents a significant opportunity for the nuclear industry. As part of the nuclear industry LLW Strategy and UK LLW Management Plan development process, consideration will be given to how best to open up these routes further.



LLWR is currently engaging with the waste management industry and evaluating requirements for further VLLW disposal routes. Options may include national or regional VLLW facilities or locating facilities on or adjacent to the site of arising subject to site end states, regulatory and stakeholder consultation.

### **Waste Packaging**

The LLWR CFAs currently specify a number of standard waste packaging requirements for disposal. The main container currently used is the Half-Height ISO Container (HHISO). The use of HHISO containers as an Industrial Package 2 (IP2) transport and disposal container is relatively costly and inevitably introduces a significant amount of additional voidage that occupies valuable disposal space in the vault.

There are considerable opportunities to optimise the transport and disposal packages in order to make best use of the capacity at LLWR. Furthermore, there are opportunities to introduce simple and cost-effective new packaging solutions for segregated wastes such as metals, incinerables and compactables which are sent for treatment.

LLWR is currently considering a range of new packaging concepts including re-usable transport containers, modular inner packaging solutions for the storage and transport of segregated wastes (e.g. metals, combustibles, compactables, etc) to treatment facilities, simpler and cheaper disposal liner and overpacks, super-sacks, wraps or similar low cost packaging for VLLW. All new packaging methods will be consulted and evaluated through a period of optioneering and consultation with customers, regulators, and stakeholders to ensure the continued safe operation of the repository and maintain compliance with regulatory requirements.

### **Waste Transportation**

The majority of waste for disposal (~80%) is delivered to LLWR by rail from Sellafield. This waste is typically either generated at Sellafield or received at Sellafield by road. It is estimated that currently around 20% of waste shipments are received at LLWR directly by road. Consignors currently organise their own transport using services provided by commercial carriers or other Site Licence Companies.

It is recognised that transport of waste and bulk materials to LLWR is a significant stakeholder issue, particularly for residents of the surrounding communities. An integrated transport study will be undertaken to determine the optimum model for movement of LLW and materials to and from the LLWR site, treatment facilities, and consignor sites. This will include evaluating the benefits of moving transport from road to rail and maximise this mode of transport, where appropriate. It is likely that the UK rail infrastructure is capable of meeting any plans to move LLW and bulk materials in a co-ordinated manner.

The concept of intermodal transport hubs for LLW will be further explored as these could substantially increase the cost efficiency of waste transport and minimise the environmental and social impacts of transport.



### **Waste Tracking and Inventory Management**

The management process to consign waste to LLWR is currently a largely paper-based system which is both resource and time intensive. The current system only provides limited capability to perform analysis and forecasting. The current practice for waste data management systems therefore offer a number of significant opportunities to automate and streamline the system resulting in cost efficiencies. LLW inventory information is currently collected and managed in multiple databases which are not always consistent due to different reporting formats, timescales, and underpinning assumptions.

The LLWR will develop and deploy a secure web-based waste tracking and inventory system to simplify waste scheduling, transportation, processing and disposal. This system will eventually replace the current paper system. The LLWR will work with consignors to develop an improved UK LLW dataset to improve LLWR capacity management, identification of strategic opportunities, understanding risks, optimisation studies, and NDA's overall liability management across its portfolio.

### **Next Steps**

Underpinned by a Strategic Review and a detailed analysis of the inventory, Preliminary LLW Topical Strategies have been developed to initiate the consultation process between consignor sites, regulators, and numerous stakeholders involved with or affected by LLW management. The approach for solving the LLWR capacity gap was integrated with the approaches for applying the waste hierarchy at the consignors' sites and opening up more fit-for-purpose disposal routes, consistent with the UK LLW Policy.

The Topical Strategies were published on the LLWR website and consulted with the National LLW Strategy Group during April and May 2008. The National LLW Strategy Group consists of experts in LLW management from a diverse range of organisations including waste producing sites (NDA and non-NDA), regulators, Government, and Local Authorities. Comments on the consultation were generally very positive that the Topical Strategies represented a sound strategic way forward. However, a number of issues were highlighted that require further evaluation and consultation when developing implementation plans.

The consulted Topical Strategies will be reviewed as part of the LLW Strategic Review and Option and Opportunity studies, as required, which will explore the issues in much greater detail including evaluation of how best the strategies are implemented and the relative cost-benefits of these approaches.

Output from the LLW Strategic Review and Option and Opportunity Studies will inform the development of the Nuclear Industry LLW Strategy and the accompanying UK LLW Management Plan.

Further information on the LLW Topical Strategies and the development of the National LLW Strategy can be found on the National LLW Strategy Group website at:  
**[www.llwrsite.com/LLW-Strategy-Group](http://www.llwrsite.com/LLW-Strategy-Group)**