

Embedding a Strategy - Changing a Culture – 14542

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ABSTRACT

The Low Level Waste Repository (LLWR) is the UK's national Low Level Radioactive Waste (LLW) disposal facility serving the nation's nuclear industry and a diverse range of other sectors. It is located close to the West Cumbrian coastline in the North West of England and is one of 19 sites owned by the Nuclear Decommissioning Authority (NDA). The site is operated by LLW Repository Ltd on behalf of the NDA.

In 2007 the publication of the UK Government Policy on the management of Solid Low Level Waste identified improvements to the waste management approach which involved a change in behaviours.

In a bid to reflect and implement Government Policy, the National Strategy for the Management of Solid Low Level Waste was issued in 2010. Its aim; to provide a high level framework within which low level radioactive waste (LLW) management decisions can be taken flexibly to ensure safe, environmentally acceptable and cost-effective management solutions that reflect the nature of the LLW concerned. Three strategic themes guided the development of the strategy;

- Application of the waste management hierarchy by waste producers
- Optimised use of existing assets for LLW management
- Opening of new waste treatment and disposal routes to enable diversion of waste away from the LLWR.

If these objectives are realised the lifetime of the LLW Repository will be both optimised and prolonged ensuring that there is sufficient capacity for the management of the UK's LLW, which is vital for nuclear decommissioning, power generation and other industry sectors.

In the years following the publication of the National Strategy significant progress has been made. The NDA has defined the implementation of the strategy as a national programme within its portfolio and appointed LLW Repository Ltd to manage the programme on their behalf. A National Programme Office has been established by LLWR to provide oversight and coordination of strategy implementation activities being undertaken throughout the UK. LLWR work closely with waste consignors and the supply chain to influence behaviours and bring about a change in culture.

Early focus and success has centred on the need for accurate and robust forecasting of inventory data and the development of Joint Waste Management Plans which provide a detailed 5 year look ahead. Two years on focus turns to education and training for those managing waste across the UK and the establishment of a Programme Board. Further development of existing services is also key. The paper describes the key themes of the national strategy, a

review of progress to date including successes, challenges and barriers. It also provides a 5 year look ahead on implementation tactics for embedding the National LLW Strategy.

INTRODUCTION

The LLW Repository was once the solution to LLW Management in the UK. The first disposals to the LLW Repository took place in 1959. The nature in which LLW is disposed of to the LLW Repository has evolved over time and what was once crude tumble tipping into shallow trenches has become disposal in steel cement grouted containers into shallow vaults. The vaults are a multi-barrier containment structure with integral leachate collection systems. The most recent vault being number 9 was opened in 2010. Further vaults are planned to support waste disposals up until 2080.



Fig. 1. LLW Repository

The LLW Repository was not recognised as a national asset until the publication of the 2007 UK Governmental Policy on Management of Solid LLW. Around this time an analysis was carried out on the forecasted future demand on the LLW Repository for disposal against the capacity available. The demand increased significantly as the UK Nuclear Facilities enter decommissioning. The analysis identified a significant risk that the capacity of LLW Repository would not be sufficient to meet the demand if current waste management approaches continued which then would result in the need for a second LLW Repository. A second Repository would provide significant challenges as there has been no financial provision made for the construction, and the identification of a suitable site and possible political and stakeholder challenges would likely be significantly time consuming also.

LLWR went on to work in partnership with NDA to develop the National Strategy for LLW management, which provides the waste consignors with a framework that they can use to make LLW management decisions ensuring that safe, environmentally acceptable and cost effective solutions are obtained in line with the waste hierarchy. The strategy aims to encourage the use of the hierarchy and alternative fit for purpose disposal solutions for very low level waste to reduce the volume requiring disposal within the highly engineered LLWR facility, thus prolonging the life.

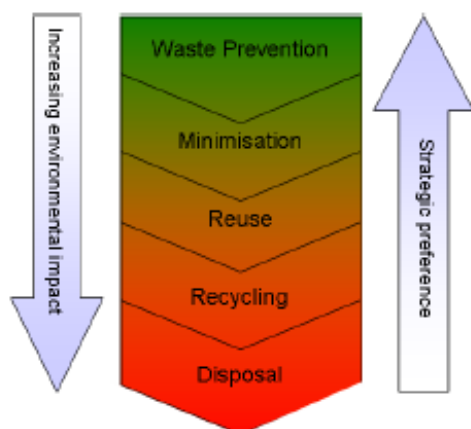


Fig. 2. Waste Hierarchy

Once the National Strategy was developed in 2010 the NDA set up a National Programme to implement it. They then appointed LLWR to manage the programme on their behalf with the key objective being to achieve a self sustaining culture of LLW Management across the nation. LLWRs unique position within the UK Nuclear industry makes them an ideal candidate to drive the changes required to waste management practice away from the historic reliance on the LLW Repository. LLWRs importance in the national LLW context cannot be overestimated. The repository is currently the only facility that can accept the full complement of LLW defined as 4 GBq/t alpha and 12 GBq/t beta / gamma.

THE CHALLENGE

In order to achieve the objectives of the National Strategy methods for managing LLW across the UK nuclear industry had to change significantly. It was evident almost immediately that there would be a number of challenges and barriers associated with implementing the National Programme. These ranged from those associated with behaviours and cultures to actual physical and logistical barriers. These are explained further below:

Behavioural / Cultural

Because disposal at the LLW Repository has been the industry default position for the management of LLW a change must be made to current behaviours and culture, not least the 'that's the way we always do it' attitude which has been adopted. There was a belief across the industry that the existing approach was sufficient and there was little incentive to change. In addition the political climate around radioactive waste management has always been sensitive with very little discrimination between risks associated with the categories of waste thus resulting in a perception that it is 'dangerous' and a reluctance to move from consigning waste to a single location like the LLW Repository and utilising multiple facilities in the UK and/or overseas for treatment or recycling.

Stakeholder acceptability posed a number of challenges. The complexities associated with meeting the expectations and demands of a diverse range of stakeholders including Government Agencies, Nuclear and Environmental Regulators, Customers, Local Authorities, Community Representatives and not least the workforce should not be underestimated nor should it be ignored. Obtaining stakeholder buy-in to the National Strategy was a key part of its development.

The level of importance attached to addressing LLW management issues rose or fell depending on which stakeholder group you were talking to. A general perception was that LLW is of low priority, from a funding and resource allocation point of view, when compared to other high hazard programmes around the UK; specifically legacy facilities located at the Sellafield Site which is arguably the most complex clean up challenge in the world. However, it was recognised that changes needed to occur to make best use of the valuable asset the LLWR had become. Furthermore, having sustainable LLW disposal routes is a key enabler to these high hazard decommissioning programmes.

It was also recognised that the implementation of the LLW National Strategy would provide invaluable learning and pave the way for future improvements/enhancements in other areas of the industry.

Physical

The practicalities and logistics associated with changes was a further challenge. Each consigning site had the resource and capability to consign waste to the repository for disposal. Moving from a single waste route and disposal package to multiple new routes and different packages for different waste types is a significant change. There was a need for the appropriate logistics and infrastructure to allow the transformation to be successfully made. There was a change to the knowledge and skill level associated with the management of LLW required of the consignors and there was a lack of familiarity with the strategy, the reasoning underpinning it and also the capacity challenge. The procedural barriers were also evident early on. Nuclear sites in the UK have detailed corporate management systems and strict arrangements for compliance with the Nuclear Site Licence and Environmental Permits. The complexity of these systems, arrangements and organisational inertia can mean change is inherently slow.

Solutions and approaches for the implementation of the National Waste Programme

The National Strategy is being implemented via a range of activities aimed at overcoming the barriers and challenges. Some of these have been firmly established over the previous two years and the remainder are the focus of the next five years.

Listed below are the highlights of the activities:

- The waste service frameworks which enables cost effective diversion of LLW from the repository.
- The establishment of a programme board, consisting of senior representatives of waste generating sites from the NDA estate.

- The roll out of the peer review process to provide a measurable benchmark of current LLW management within a facility or site against best practice across the NDA estate.
- The development and roll out of a training framework to enhance waste management skills.
- The implementation of standard job profiles and competency frameworks within the consignor organisations to underpin the training framework.
- The implementation of a knowledge management process to ensure that learning from experience from the programme is captured and disseminated.

The positioning of LLWR made them an ideal candidate to lead the national waste programme on behalf of the NDA as it requires cross estate coordination. LLWR have a unique insight into both the NDA and non – NDA estate Site License Companies with whom they already have longstanding relationships. The LLWR are the integrator across the UK Nuclear Industry for all things associated with LLW Management and there is hope that this scope could increase to other areas of nuclear waste management going forward.

SUCCESS TO DATE

Joint Waste Management Plan

A Joint Waste Management Plan (JWMP) is a proactive rolling management plan looking forward 5 years at waste arisings and the expected support services required. The plans have been developed by each consignor working closely with a dedicated LLWR Service Delivery Manager. The plan contains a benefit map and transformational activities to be undertaken against each of the eight National Waste Programme Elements:

- Disposal
- Metal Recycling
- Combustible and Supercompactable Waste
- Very Low Level Waste and Low Activity Low Level Waste
- Waste Characterisation
- Waste Packaging and Transport
- Low Activity Waste Enabling
- Low Activity Waste Business and Information Reporting

The JWMPs are then used to generate a baseline of activities and a schedule which can be monitored and supported appropriately. These documents support LLW strategy implementation and enable improvement in the cost effectiveness of LLW disposal across the UK. The plans are approved at executive level to ensure the correct level of commitment to the delivery of the activities listed within. These activities form the basis of the National Waste Programme (NWP) and tracked through monthly reporting and delivery process to assess performance, highlight success and deliver an integrated approach to dealing with the UK's LLW.

Progress as well as information on emerging risks, opportunities and threats is collated and presented at the NWP Programme Managers Monthly Meeting. The information is then collected and analysed for reporting in the NWP Dashboard. To date all the NDA Estate consignors have valid JWMP in place and focus is now concentrating on helping the non – NDA

estate to develop and implement JWMP. This programme management approach and associated reporting tools continue to mature over time and are seen by all stakeholders as increasingly valuable.

Dashboards / Monthly Metrics

Key metrics are collated and used to demonstrate the effectiveness of numerous aspects of the National Programme including:

1. Volume of VLLW diverted away from LLWR to alternative disposal sites.
2. Tonnage of waste diverted to treatment facilities.
3. Application of waste hierarchy to ensure only those wastes requiring highly engineered barriers are disposed of at LLW Repository.
4. Ensuring new approach does not impact safety or environmental performance at consignor sites.

These key metrics are also published on the LLWR website.

The objective of this is to encourage transparency and communicate progress of all waste producers to relevant stakeholders. The metrics and forecasts provide useful information to the regulators and supply chain companies providing treatment and disposal services and local authorities.

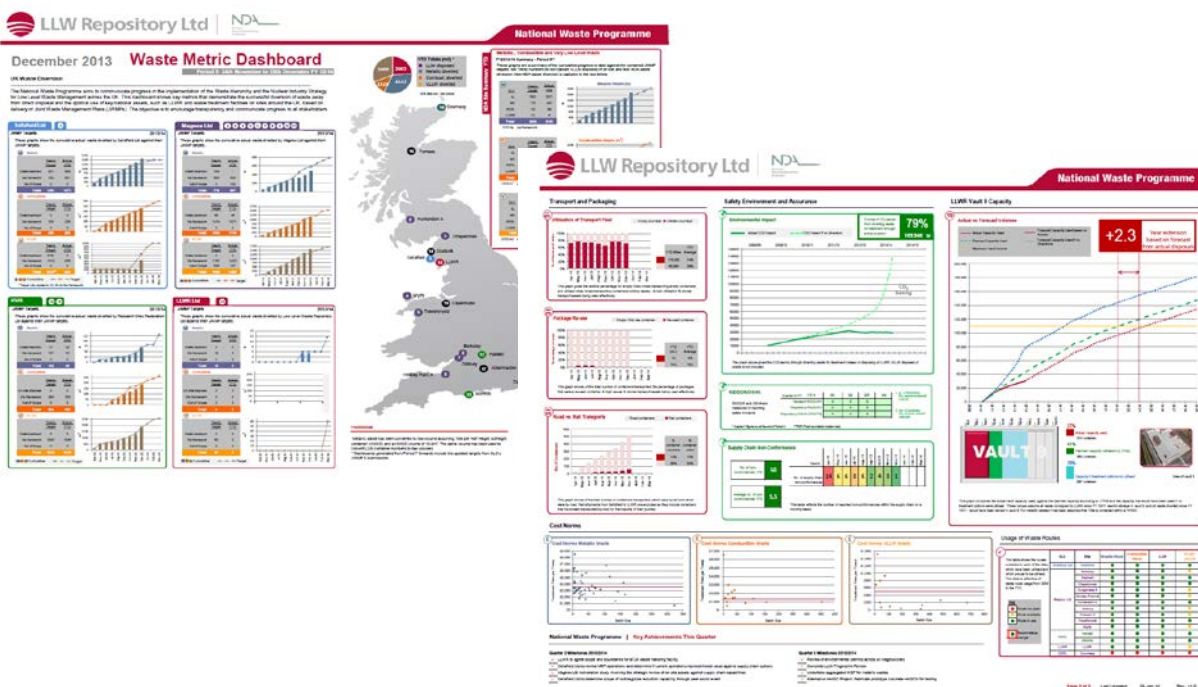


Fig. 3. Dashboard

Waste Management Services Organisation

The 2010 National LLW Strategy identified the access and exploitation of new waste management routes as a key strategic theme. Establishment of such waste management routes historically posed barriers for waste generators across the UK. For example there is significant cost, resource and time associated with procuring bespoke waste management solutions. To mitigate these issues LLWR introduced the Waste Management Services organisation.

This team's task was to provide arrangements for waste producing sites to have easy access to waste management services via the supply chain. Framework contracts were initiated for a diverse range of supply chain services including Metallic and Combustible waste treatment and Very Low Level waste disposal. The new services complimented the already existing Low Level Waste Disposal and Supercompaction services to assist customers manage their LLW at every stage of the waste hierarchy from cradle to grave.

Similar framework services were also introduced for enabling services such as Characterisation, Packaging and Transport. It quickly became apparent that these areas were often barriers to successful implementation due to consignors either not having the expertise or resource in house to facilitate or did not view as part of core activity. The Waste Management Services organisation also includes a dedicated customer team who support customers in applying the waste hierarchy. Service Delivery Managers are aligned to customers to support all of their needs from day to day advice to support on influencing and changing behaviours within the waste producing organisations.

The services currently available to LLWR customers are detailed below.

Metallic

The metallic waste treatment service provides opportunities for customers to recycle metallic LLW whilst reducing the volumes of LLW disposed at the LLWR. This is better for the environment, a more efficient use of resources and gives customers greater flexibility in how to manage low level radioactive waste.

A range of techniques such as size reduction, shot blasting and melting is available to treat the metallic waste. Secondary waste arising from the process such as shot blast media or slag from the metal melting which contains the bulk of the radioactivity is then further treated or disposed of via the most appropriate route. Material types to date have been successfully recycled include carbon steel, stainless steel, aluminium, brass, copper and lead as well as other less common metals. In general up to 98% volume reduction of the original waste consigned is achieved by this service with around 2% being disposed of as radioactive waste.



Fig. 4. Metal Treatment



Fig. 5. Metal Melting

Combustible

The combustible waste treatment service uses thermal treatment to reduce LLW disposal volumes. This gives customers the potential for greater cost efficiencies and results in less waste being disposed of at the LLWR. A wide variety of material is suitable for thermal treatment and can reduce waste volumes disposed at the LLWR site greatly. The list of material acceptable for thermal treatment is extensive, but most commonly includes; paper and cardboard, packaging materials, plastic sheeting, wood, oil and protective clothing.



Fig. 6. Combustible Treatment

Supercompactable

The supercompactable waste treatment service minimises the volume of LLW to be disposed of at the LLWR. This waste is subject to high force compaction which reduces the overall volume by up to 70%. Waste for supercompaction can be received loose, bagged or drummed and commonly includes soft waste such as plastic, protective clothing and rubber. LLWR are looking to expand this service to also include the supercompaction of asbestos and asbestos

contaminated waste.

Very Low Level

The Very Low Level Waste (VLLW) disposal management service involves the disposal of high volume low activity waste at appropriately licensed commercial hazardous waste landfill sites throughout the UK. This type of lightly contaminated low risk waste does not require the same degree of engineered protection provided by the LLWR site. This VLLW makes up 67% of the 2010 Radioactive Waste Inventory. All organisations dealing with radioactive materials produce some waste fitting the definition of VLLW and this typically includes paper, cloth, plastics, wood, filters, rubble, soil, asbestos and metal waste.

Low Level Waste

The LLW disposal service is for LLW that cannot be treated or residual wastes from a treatment process. Waste is received at the LLWR site by rail or road in containers. Each container is filled with a cementitious grout to remove any voids and, provide stability for final cap. The container is then disposed of in the engineered vaults.

Waste Characterisation Service

The waste characterisation service is an enabling service that allows customers to seek advice, sample recovery, analysis, data interpretation, measurement and routing guidance for their waste. This leads to a more robust underpinning of the assumptions, measurements and calculations required when producing documents needed to manage the waste through exemption, treatment or disposal routes. The characterisation service provides the necessary information for the customer to correctly manage their low level waste in line with the waste hierarchy.

Packaging Service

Having a supply of fit for purpose packages to support LLW transport is a key part of our waste treatment and disposal portfolio. All packages are appropriately licensed for radioactive waste transport. LLWRs packaging fleet consists of multiple types of packages, including industrial package – Type 2 (IP2) rated versions suitable for road, rail and sea transport. LLWRs capability also includes the development of bespoke packaging solutions to meet specific customer needs. In recent years LLWR has introduced a number of new packages focused on waste treatment and recycling.



Fig. 7. IP 2 Rated Package

Transport Service

LLWR offer a complete transport service including help and advice on all lower activity waste and dangerous goods transport matters. This includes transport and dangerous goods consignment services to support waste treatment and disposal. It also includes multi-modal transportation of waste consignments to facilities in the UK and overseas. All transport and logistics services are in full compliance with the relevant national / international transport regulations. All waste consignments under the control of LLWR benefit from our membership of the nationally recognised RADSAFE responsible for transport emergency arrangements.

New Waste Service Framework

The current Waste Services Framework is drawing to an end. LLWR have worked closely with consignors and the supply chain to incorporate learning and develop improvements prior to a retendering process. Metals and Combustible services improvements are likely to include the placing of large aggregated orders from across the UK estate to access lower prices and give security to the supply chain.

A new edition to the framework will be a professional services option which allows customers to access a range of technical expertise to enable their organisation to successfully implement the strategic objectives.

LOOKING AHEAD

A key aspect of LLWRs next five year contract with the NDA is to continue to lead the implementation of the National LLW Strategy on behalf of the NDA. LLWR's focus on this element of the contract is on supporting the embedding of the cultural change within waste consigning organisations. There are three key initiatives to support the delivery of this change:

- Peer Review
- Programme Board
- Training Framework

Peer Review

The peer review is a series of independent reviews of LLW management practice across the consignor organisations that generate and manage LLW. These are being undertaken to establish the effectiveness of LLW Management across the UK and benchmark performance across different sites. The team of reviewers is made up of waste management specialists from across the estate. The objective is to identify and share best practice across sites / organisations and to identify opportunities for improvement.

The peer reviews are conducted as three day visits to a host plant, facility or site and involve a combination of plant walk downs, interviews / discussions with personnel and reviews of documentary evidence to gather evidence on the quality of LLW management practice across the broad range of areas. The evidence is then used to derive a score based on a scoring matrix that has been developed in collaboration with the waste generators. This scoring is compared against self – assessment scores of current and aspirational practice provided by the host prior to the assessment to identify good practices and opportunities for improvement. A report is then provided to the host on completion of the review for conversion into an improvement plan. It is intended that the outcome of the peer review process will generate improvements in LLW management practice in response to the identified opportunities across the wider LLW management community.

A best practice model is built on a numeric scale 1 -5 scale. The scores represent a gradient in the quality of LLW management practice between poor practice (a score 1) and best practice (a score 5). The scoring matrix is divided into a series of narrative areas relating to LLW management practice and then into a series of sub elements – these represent the attributes that will be considered during the peer review process.

The areas of a sites waste management arrangements which will be assessed and scored during the peer review process include:

- Characterisation
- Inventory management
- Learning From Experience and engagement
- Packaging and transport
- People and people organisation
- Policies and strategies
- Storage
- Training and qualification
- Waste management operations
- Waste routes and waste route availability.

Programme Board

As the NWP matures it is increasingly important that the consignors are fully engaged in the delivery of the National Strategy for LLW Management. In order to develop and enhance this engagement, senior level oversight and governance of the NWP is required and will be provided by the Programme Board.

The objectives of the Programme Board are:

- To ensure strategic alignment between the NWP and the Site License Companies.
- To provide strategic oversight of the LLW management across the NDA estate.
- To provide oversight of strategic level programme risks and opportunities.
- To drive commitment to deliver the NWP within their organisations.
- To ensure JWMP support the NWP delivery.
- To influence the direction and status of the NWP within the Site License Companies.
- To ensure cost effective and timely responses to the Site License Companies programmes.
- To provide early engagement and understanding of major projects within the estate to ensure that LLW waste is suitably managed during the life of the project.

The establishment of the programme board is a crucial step in ensuring a meeting of minds e.g. both bottom up and top down approach.

Training

The third element to support the cultural change within consigning organisations is the development of a training framework which supports the embedding of best practice. LLWR conducted some initial analysis with the consigning sites to understand their arrangements for waste management roles and responsibilities for staff at different levels of the. There are some commonalities across the organisations although the role descriptions do tend to vary.

The range of activity within the Site License Companies and across the wider UK context indicates that there is an opportunity to collaboratively build on this to support delivery of the UK LLW Strategy. Therefore LLWR have developed a training framework which identifies a range of modules, structured to provide knowledge and skills across the LLW management lifecycle as well as overarching knowledge areas (regulatory, nuclear industry and LLWR specific).

The modules will be delivered both as classroom and E learning modules. Class room modules will be available for Site License Companies to roll out using their own training resources or central resources provided by LLWR. E Learning modules will be available to the wider community through the training portal.

CONCLUSION

Over the past five years LLW Repository Ltd has focussed on:

- Building awareness of the need to change
- Working with waste generating sites to create a desire to change.
- Providing access to best practice, expertise and knowledge of how to change.
- Putting in place commercial and logistical arrangements to give waste producers the ability to change.
- Reinforcing change through reporting of progress and publicising achievements.
- Enabling change through the introduction of new waste treatment services and disposal routes.

Whilst progress has been made to breakdown and overcome barriers much remains to be done. Incentivising the right behaviours and removing blockers is contributing to successful implementation, but we can not lose focus on the end game.

Addressing behaviours produces results in the short-term but it is a culture borne of practices accumulated over decades and generations that is much harder to change. LLWR is at the beginning of this journey. Embedding a change culture involves a universal approach that touches every decommissioning project on every waste generating site.

To conclude LLW Repository Ltd are delighted to say that the NDA recognised the successful delivery of LLWRs first five year contract term of a 17 year contract (5+5+5+2) with the award of the second 5 year term on the 27th March 2013.



Fig. 8. Dennis Thompson (LLWR Managing Director), John Clarke (NDA Chief Executive), Gerry McGill (PBO Chairman) signs the LLWR Second term contract.

We look forward to working in partnership with industry colleagues and continued success.

REFERENCES

1. National Strategy for the Management of Solid Low Level Waste was issued in 2010.
2. 2007 UK Governmental Policy on Management of Solid LLW.
3. LLW Management Plan.
4. LLW Strategic Review, LLW Repository Ltd, 2008.