Storage and Disposal of ILW and HLW in the UK: Implications for Copeland

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1. INTRODUCTION

1.1 Background

In July 2006, the Committee on Radioactive Waste Management (CoRWM) published its recommendations to Government on the management of the UK's intermediate-level (ILW) and high-level (HLW) radioactive wastes[1]. CoRWM formed its recommendations following an extensive programme of public and stakeholder engagement (PSE).

Although CoRWM's primary recommendation is for geological disposal, the committee also acknowledged that a robust programme of interim storage must play an integral part in the long-term management strategy.

In October 2006, Defra responded to CoRWM's recommendations on behalf of the UK Government and devolved administrations. In summary their response states that *'Government accepts that geological disposal coupled with safe and secure interim storage is the way forward for the long term management of the UK's higher activity wastes*'. Furthermore, Government announced that the Nuclear Decommissioning Authority (NDA) is to have its role expanded and will now oversee the full cycle of radioactive waste management in the UK, and will be responsible for implementing geological disposal of higher activity wastes. As part of the expansion of the NDA's role, the role and skills of Nirex are to be transferred to the NDA and then Nirex will be wound up.

The publishing of CoRWM's recommendations and the Government's response are broadly consistent with the *Managing Radioactive Wastes Safely (MRWS)* process that Government launched in 2002. MRWS consists of 4 stages as set out in Table 1. CoRWM led the consultation in Stage Two. Government is now expected to commence a further consultation on siting issues within Stage Three.

The MRWS process was initiated because of a decision in 1997 by the then Secretary of State for the Environment to reject an appeal from Nirex against Cumbria County Council's decision to refusal Nirex planning permission for the construction of a Rock Characterisation Facility (RCF) at a candidate site for a deep geological repository near Sellafield.

Table 1: *The Managing Radioactive Wastes Safely (MRWS) process set out by Government in 2002.*

The MRWS programme for action with estimated dates		
Stage One	Consultation on techniques for public participation, scientific research and institutional arrangements for the interim period (the MRWS consultation)	2001-2002
Stage Two	Public consultation and assessment of possible waste management options leading to the Government's decision.	2003-2006
Stage Three	Public debate on how the Government's decision should be implemented, including what decision making process should be adopted.	2007
Stage Four	The start of the implementation process including the introduction of any necessary legislation and other measures.	c. 2008

1 Managing our Radioactive Waste Safely: CoRWM's Recommendations to Government. July 2006.

1.2 CoRWM's recommendations and implications for Copeland

CoRWM considers geological disposal to be the best available approach for the long-term management of the UK's radioactive waste and is recommending a flexible and staged decision-making process to site a repository. CoRWM recognises that the implementation process may take many years successfully to identify and characterise a site, and to build a repository, and therefore CoRWM also acknowledges that interim storage of waste will be required in the immediate future. As an indicative timetable, CoRWM suggested that a repository could be available to accept wastes in 2045 and would operate for 65 years.

CoRWM's recommendations and proposals for implementation are founded on a number of key principles:

– *volunteerism*, meaning that any proposals for the siting of a repository or interim store should be based on a community's expressed willingness to participate;

– *veto,* meaning that a community should have the right to withdraw from the process up to a pre-defined point;

– *community benefits,* which includes both *participation packages* and *benefits packages*, meaning that the community should receive a package of benefits for engaging in the process and a package of benefits in mitigation of any real or perceived impacts from hosting a repository or interim store; and

– *partnership,* meaning that the process should be based on an open and equal relationship between the potential host community and those responsible for implementation.

CoRWM does not make any comment on where a repository or interim stores should be built in the UK but, throughout their report, two key points are highlighted:

– all of the HLW and the majority of the ILW in the UK arises on the Sellafield site or has to be transported there for treatment or packaging (i.e. the majority of the waste is already located within Copeland); and

– most of the participants in the PSE programme argued that the transport of radioactive waste should be minimised or avoided altogether and CoRWM recommended that the 'double movement' of waste between interim stores and final disposal facilities should be avoided as far as possible (i.e. the proximity principle should be respected).

These two points can be taken together to mean that, all else being equal, it would be preferable for the ILW and HLW to be managed in Copeland rather than elsewhere in the UK. However, all sites and communities are obviously not equal in terms of their demographic, geological and environmental characteristics and, therefore, the question as to whether the UK's I/HLW should or could be managed in the long term in Copeland rests on the answers to two fundamental questions:

1. Is there a suitable site in Copeland at which a repository or interim store can be built?

2. Would the local community in Copeland be supportive of proposals to build a repository or interim store?

Copeland Borough Council needs to consider these questions, and the possible answers to them, when they formulate their nuclear policy. This should enable the council to decide how they should engage in any future discussions with Government and, in particular, how to respond in the event that an explicit call for volunteer communities is made by Government or an implementing body. It should be noted that the Defra Environment Minister in a letter dated October 2006 to the Local Government Association invited *"any local authority or group of local authorities who wish to be involved in early discussions on how partnership arrangements could work in practice to contact the Minister"* which could be construed an implicit invitation to express an interest in volunteering.

A subsidiary question is whether there would be any benefit to Copeland Borough Council and to Government if, subject to Council policy, the council were to express willingness to participate *before* any explicit call for volunteers is made on the basis that, whatever happens, the presence of waste in Copeland means that council and the community have to form part of any future management plan.

As part of this project, a workshop (see Appendix A) was attended by the Leader and Officers of Copeland Borough Council at which it was confirmed that Copeland Borough Council would not wish formally to express an interest to volunteer at this stage but that their interest at the current time was targeted on potential arrangements for interim storage of waste pending the availability of a repository.

It was also recognised that Copeland Borough Council would need resources to support the decision making process resulting in the decision whether or not to volunteer. Copeland Borough Council would look to a participation package as a means of funding these resources.

In addition to the potential to participate in the decision relating to siting of a I/HLW repository, Copeland Borough Council recognise that the NDA have invited tenders with a view to letting a contract to manage the LLWR near the village of Drigg. To inform the prospective tenderers about socio-economic issues specific to Copeland and other adjacent areas, Copeland Borough Council have prepared a community requirements document which provides guidance to tenderers. The document sets out information about the area and identifies the expectations of Copeland Borough Council and other interested parties with respect to the provision of socio-economic information to be included in their tender and engagement with local democratically elected bodies. The aim of the document is to ensure that tenderers address socio-economic issues and, as part of the tendering process, demonstrate how they will contribute to the development of sustainable communities in Cumbria in the future.

1.3 Objective of the project

The primary objective of this project is to provide relevant information to Copeland Borough Council to inform the development of their nuclear policy, particularly with regard to volunteering in any future siting programme for a repository or interim store.

More specifically, the project seeks to identify any potential issues that would influence a decision to volunteer in the case of different implementation scenarios such as:

– a siting programme for a repository that focusses only on existing nuclear communities rather than looking nationwide, or

– a siting programme that plans a number of local or regional interim stores rather than one centralised store.

The first scenario may arise, despite CoRWM's recommendations, because international experience indicates that it is usually only communities with positive 'good neighbour' experiences with the nuclear industry that are likely to volunteer to host a repository.

The study seeks to identify any risks and opportunities to Copeland (both the community and the council) and Government that could arise in different scenarios. It also examines whether issues such as the inventory of ILW and HLW, and estimates of the costs and timescales for siting and implementation programmes may affect the balance of risks and opportunities under the different scenarios.

2. MANAGING THE UK'S RADIOACTIVE WASTES

2.1 The UK inventory of ILW and HLW

The UK inventory of ILW and HLW was extensively described by CoRWM in their inventory report[2] which also considered variations to the inventory that may arise as a result of policy changes associated with such things as extending the life of operational reactors, building new power reactors etc.

Here we summarise that information and provide the quantities and proportions of the total UK inventory that currently reside in Copeland, and will do so in the future due to anticipated decommissioning activities. In these calculations, we have taken account of current and future arisings on the Sellafield site (including Calder Hall) and at Windscale.

To complete the table, some additional information has been extracted from the UK's second national report on compliance with the obligations of the IAEA's Joint Convention on the safety of spent fuel management and on the safety of radioactive waste management, and the 2004 UK Radioactive Waste Inventory.

We have also then looked at the arisings from nuclear sites within roughly 100 miles distance of Copeland. This is because both CoRWM and the NDA have considered the option of regional waste stores. The sites we considered are the twin AGRs at Heysham, the single AGR at Hartlepool and the Magnox site at Chapelcross. We have not taken account of arisings from other nearby sites such as Barrow and Springfields because these are small in comparison and are unlikely to change any of the conclusions from this strategic overview.

The summary data are provided in Table 2 and from these data a number of important observations can be made.

– *Spent fuel:* the majority of the current stocks of spent fuel (76%) are at Sellafield because past policy has been to ship most spent fuel from the power reactors for reprocessing or storage. A number of reactor sites are now planning for the construction of on-site interim fuel stores to hold fuel that is not subject to reprocessing contracts. This may reduce the overall proportion of UK spent fuel stocks held at Sellafield in the future but there remains considerable uncertainty over the management of spent fuel not subject to reprocessing contracts. The NDA is looking at this issue for spent fuel within its remit but a significant proportion of these 'without reprocessing contract fuels' arise from British Energy reactors and, thus, are outside of the NDA's Strategy.

– *HLW:* the entire current stock of HLW resides at Sellafield and will remain there in the future. Note that HLW previously recorded in the Dounreay inventory has been reclassified as ILW because it is not longer heat generating. The total quantity of HLW that will arise in the UK depends on decisions made regarding the reprocessing of UK and foreign spent fuel, and any decisions on new build. Not all of the HLW at Sellafield is yet in solid (glass) form and 1890 m^3 of high active liquor has yet to be solidified to make it passively safe.

2 CoRWM's Radioactive Waste and Materials Inventory –July 2005. CoRWM Document No: 1279

– *ILW:* the majority of current ILW arisings (70%) are held at Sellafield but this proportion is anticipated to fall to less than 50% as decommissioning works on other sites progress, and on-site interim stores are constructed to contain this waste. The total quantity of ILW held at Sellafield will however continue to increase as site decommissioning progresses. There remains some uncertainty over the total amount of ILW that will require disposal because decommissioning plans are still in development. In particular, options for the accelerated decommissioning of the Magnox stations, as opposed to previous plans for extended periods of in situ care and maintenance, may affect both the timing and quantity of ILW that will need to be managed. The NDA is evaluating alternative options for the construction of interim ILW stores including siting a single national facility or multiple local or regional facilities.

Table 2: *Summary of waste arisings in Copeland and from nearby sites based on CoRWM's baseline inventory (packaged volumes unless stated).*

	Current arisings[3]	**Total predicted UK stocks (m^3)**	**Percentage of total current UK arisings**	**Percentage of total predicted UK stocks**
Spent fuel				
Whole of the UK	7790 te[4]	8150[5]	-	-
Sellafield	5940 te[6] 8140 te[7]	-	76%	-
Windscale	15 te	-	< 1%	-
Heysham/Hartlepool AGRs[8]	45 te	2320	< 1%	28%
Chapelcross Magnox	Defuelling	n/a	-	-
HLW				
Whole of the UK	456 m^3 (vitrified) 1890 m^3 (liquid)	1290 m^3 (vitrified)	-	-
Sellafield	456[4] m^3 (vitrified) 1890 m^3 (liquid)	1290 m^3 (vitrified)	100%	100%
Windscale	none	none	0%	0%
Heysham/Hartlepool AGRs	none	none	0%	0%
Chapelcross Magnox	none	none	0%	0%
ILW				
Whole of the UK	82,500 m^3	348,000 m^3	-	-
Sellafield	57,500 m^3	150,000 m^3	70%	43%
Windscale	692 m^3	6140 m^3	< 1%	< 2%
Heysham/Hartlepool AGRs[9]	1040 m^3	24,300 m^3	1%	14%
Chapelcross Magnox	79 m^3	7400 m^3	<1%	2%

[3] At 1.4.2004.
[4] Assuming 25% of total spent PWR fuel from Sizewell B and excluding foreign LWR spent fuel involved in commercial reprocessing.
[5] This relates to UK AGR and PWR fuel with no current contracts in place for this spent fuel to be reprocessed.
[6] Excluding foreign LWR spent fuel involved in commercial reprocessing.
[7] Including foreign LWR spent fuel involved in commercial reprocessing.
[8] Assuming that these sites are responsible for c. 43% (6/14) of total AGR spent fuel arisings. 1 AGR element assumed equivalent to 0.43 Te U.
[9] Assuming that these sites are responsible for c. 43% of total AGR ILW arisings.

In addition to the above waste categories, the following other long-lived radioactive wastes were identified by CoRWM as also requiring long-term management, although these are outwith the scope of the current study.

– *Separated plutonium:* the entire stock of separated civilian plutonium resides at Sellafield and it is currently planned that it will remain there in the future until such time as a final management solution is implemented. The total quantity that will require disposal depends on decisions made regarding the future reprocessing of UK spent fuel, the use of mixed-oxide (MOX) fuel in UK power reactors, and any decisions on new build.

– *Depleted, natural, low-enriched and high-enriched uranium:* There are various types of uranic fuel materials held at fuel fabrication and processing sites. The total quantity that will require final disposal depends on decisions made regarding the future reprocessing of UK spent fuel, future plans for fuel fabrication and the enrichment of natural uranium within the UK, and MoD requirements for high-enriched uranium. It is currently planned that a significant proportion of these materials will be stored at Capenhurst.

2.2 LLW and Contaminated Land

The storage and disposal of LLW was outside of the remit of CoRWM and is also outside of the scope of this report but Government decisions on its management may have implications for how other categories of wastes are managed.

Defra held a consultation on LLW policy in 2006 but has not yet published its outcome. One key issue discussed in that consultation was the possibility of changing the definition of very low level waste (VLLW) so that it could *"in appropriately controlled quantities be safely disposed of with domestic refuse".* The implication of this is that VLLW could be disposed of in facilities with a design closer to that of a modern municipal landfill than to Vault 8 at the LLWR. Given the acute shortage of LLW storage and disposal capacity in the UK this suggestion, if adopted, may lead to a significant change in LLW management practices and, therefore, to plans for the continued operation of the LLWR.

Another recent development is the Direction in 2005 by the Scottish Executive to the Scottish Environment Protection Agency (SEPA) to refuse an application by UKAEA to dispose of LLW from the Dounreay site to the LLWR. This opens up the debate for new LLW and VLLW disposal capacity to be provided throughout the UK on a regional or local basis. If this approach were to be followed, then future plans for the LLWR could be based on it taking only wastes from Sellafield (including Windscale and Calder Hall).

Furthermore, there is a considerable volume of contaminated land that, if dug up, is likely to be classed as LLW. The inventory of this material is uncertain. The NDA Strategy document estimated the volume of contaminated land on the Sellafield site alone to be in the region of 20 million m^3. Whilst this is outside the scope of the CoRWM recommendations it may have a material bearing on the practical implementation of those recommendations.

2.3 Storage capacity and future requirements

For security reasons, information on the location, design and content of the existing radioactive wastes stores in the UK is limited. From publicly available information[10] details of the known stores have been summarised in Table 3. The majority of these have been constructed at Sellafield to contain waste products from fuel reprocessing, but Magnox have also constructed 2 stores to contain ILW from decommissioning operations. Other stores are being planned, including two further EPS stores at Sellafield.

Table 3: *Summary of existing HLW and ILW stores and their capacity.*

Location	Store type	Waste	Capacity per store (m^3)	Current number of stores	Total capacity (m^3)
Sellafield	Engineered drum store (EDS)	ILW	4400	2	8800
	Encapsulated product store (EPS)	ILW	20,400	2	40,800
	Waste packaging and encapsulation plant store (WPEPS)	ILW	5500	1	5500
	Vitrified product store (VPS)	HLW	1200	1	1200
Magnox sites	Hinkley and Hunterston stores	ILW	4800	2	9600

The total existing storage capacity for ILW and HLW in the UK is thus approximately 66,000 m^3. Note that the majority of spent fuel is currently stored in ponds or dry stores awaiting reprocessing. There is currently no dedicated store for spent fuel.

This storage capacity has to be compared to the anticipated total waste arisings which will need to be stored pending the availability of a repository. From Table 2, these volumes are:

– spent fuel 8150 m^3

– HLW 1290 m^3

– ILW 348,000 m^3

This means that the shortfall in total waste storage capacity for the whole of the UK is approximately 290,000 m^3.

CoRWM considered two options for the location of new stores required to meet this shortfall: (i) centralised, and (ii) at the location of waste arisings, and commissioned a report that made predictions for the number and costs of stores that would be required[11]. That report made an assumption that future stores would similar in design to the existing encapsulated product store (EPS) at Sellafield. This is a heavily engineered (protected) store design with a capacity of 20,400 m^3.

10 NII (2008) Intermediate Level Waste Report. www.hse.gov.uk/nuclear/ilrw
11 Crawford M and Wickham S (2005) CoRWM Criteria Discussion Paper: Cost

In the 'centralised' scenario, and assuming this centralised facility was located at Sellafield, the number of additional EPS stores that would be required is estimated to be 16. In the 'at the location of waste arisings' scenario, the number of additional stores is estimated to be 25, of which 7 would be required at Sellafield to meet the demand of that site and an additional 18 at other sites. The difference in the number of stores between the two scenarios (16 and 25, respectively) is due to the fact that a common design was assumed and, at some sites, this would provide redundant capacity. This redundancy is removed by centralising the stores, thus providing more efficient use of storage space.

The date these stores would be required, and their period of operation, is dependent on the rate of site decommissioning and the date the repository becomes available. In comparing these variables, a number of scenarios present themselves that were not explicitly considered by CoRWM.

1. If the decommissioning schedule was slowed down, and the development of the repository was accelerated, then fewer interim stores would be required because then some wastes could be sent directly to the repository without the need for interim storage. In particular, if the decommissioning of the Magnox reactors followed the 'care and maintenance' plan that BNG has been developing, then it is entirely likely that a large amount of waste would not arise until after the repository is operational. The 'care and maintenance' plan assumes the bulk of the reactor building (containing the majority of the ILW and higher activity LLW) would be mothballed for around 100 years before the reactor is demolished. This would occur in c. 2100, which is some 50 years after CoRWM assumes a deep repository would begin accepting wastes (2045). In this scenario, some stores would still be required to contain early decommissioning wastes, as well as the HLW and spent fuel, but the number of ILW stores required could be expected to reduce by around 50%.

2. If decommissioning is accelerated, and site end-points are achieved within a few decades and, in particular, the Magnox reactors are decommissioned to achieve final site clearance in 25 years (as proposed in the NDA Strategy), then the maximum number of stores will be required.

3. If a repository was delayed substantially, and storage was required for 300 years (as suggested by CoRWM's storage options), then the current stores would need replacement or refurbishment because their design lives are in the region of 100 years. These replacement costs are included in the CoRWM option costs for storage.

2.4 Implications for Copeland Borough Council's Nuclear Policy

1. Due to ongoing decommissioning at Sellafield and Windscale, and at sites elsewhere across the UK, the total quantity of radioactive waste located in Copeland will continue to increase. At a minimum, Copeland will be host to all of the HLW, the majority of spent fuel and around half of all of the ILW.

2. The exact proportions of spent fuel and ILW located in Copeland will be dependent, in part, on the number and location of interim waste stores that may be built at other sites in the UK and their lifetime. This is currently an issue being examined by the NDA with regards ILW and British Energy with regards their spent fuel not subject to reprocessing contracts. Copeland may wish to engage with the NDA and British Energy better to understand their plans.

3. Sellafield has the majority of the existing waste storage capacity in the UK but this is far short of the total capacity that would be required to contain all of the UK's HLW and ILW if it all were to arise before a repository becomes available. The total shortfall in capacity is around 290,000 m^3 which equates to around 16 new 'EPS style' stores if all waste stores were centralised or 25 if the stores are located at the sites where wastes arise.

4. Given the large amount of waste arising at Sellafield, a minimum of 7 new 'EPS style' stores are estimated to be needed in Copeland if stores are built at the site of arising, or 16 if a centralised storage facility were located in the area. There is clearly a need to integrate Copeland's nuclear policy and Cumbria's role as the local planning authority to deal with this issue.

5. The number of interim stores required could be significantly reduced if the decommissioning schedule was slowed down and, in particular, the Magnox reactors were managed through a 100 year 'care and maintenance' plan. In this case, it is likely that a repository could be available in around 2045, some 50 years before the majority of the Magnox ILW would arise.

3. WASTE MANAGEMENT SCENARIOS

Although CoRWM's primary recommendation is for geological disposal, the committee also acknowledged that a robust programme of interim storage must play an integral part in the long-term management strategy. Irrespective of when and where a repository may be built, there is a need for interim storage capacity, particularly for ILW, because wastes are arising now as decommissioning work proceeds on the sites. The main issue would be whether or not storage should take place centrally or at multiple sites close the places the waste arises.

As a result, any coherent strategy for the management of the UK's ILW and HLW must combine consideration of the siting a repository with consideration of the siting of an interim store.

It is worth noting that the CoRWM storage options were based on an assumed storage period of 300 years, after which some other option would need to be implemented. This assumed long period of storage had significant impacts on the design, operation and cost of CoRWM's options. The Government's response to CoRWM's recommendations and the merging of Nirex into the NDA, all suggest that Government wishes to proceed promptly with the development of a repository. As such it would appear that CoRWM's assumptions for the storage options are not directly applicable to the type of interim storage that will be required from now until the repository becomes available in around 50 years.

Below we set out the main options for siting both a repository and a store, and identify the main implications of these for Copeland.

3.1 Options for the siting of a repository

Following the Government's response to CoRWM's recommendations, there remain a number of uncertainties with respect to the implementation of a future disposal programme. With regards to the siting aspects of implementation, there are a few alternative possible options that Government could choose from, and each would have implications for Copeland Borough Council's nuclear policy. These options are:

1. *A nationwide siting process.* This option follows CoRWM's recommendations. It would involve an implementation process based around a UK-wide site selection process, in which volunteer communities would be sought from regional areas found to be consistent with a set of coarse site suitability criteria.

   In this option, Copeland would be expected to wait until such time that an implementation body completes the national screening exercise to identify suitable regions, and invitations to volunteer are issued to all suitable local authorities. This option includes no bias for or against existing nuclear communities and, therefore, Copeland would be treated in the same manner as any other potential volunteer local authority.

2. *A focussed siting process looking only at a small number of nuclear communities.* This option takes a pragmatic view, based on international experience, that it is probable that only existing nuclear communities are likely to volunteer to host a disposal facility. In the UK, there are the 20 NDA sites plus another dozen or so nuclear sites owned by British Energy, AWE and military establishments that could form a short-list. Of these, at least half

might be rapidly rejected on the basis of proximity to urban areas, threat from sea-level rise etc.

In this option Copeland would be likely to find itself short-listed together with a few similar nuclear communities. There would be a sharper focus on Copeland at an earlier time, heightening the need for the council to develop an unambiguous nuclear policy.

3. *A 'Copeland first' siting process.* This option accepts that the majority of the waste is already located within Copeland and seeks to minimise the further transport of the waste. The process would give priority to Copeland and would first seek to determine whether a suitable location could be found within Copeland for the development of a repository. Only if no suitable location could be found would other areas of the country be considered.

   In this option, all attention would be on Copeland from a very early stage and it would be essential for the council to have a clear policy that sets out how it would respond to and engage in the process.

3.2 Options for the siting of interim stores

It is evident that additional storage capacity will be required to contain the decommissioning wastes that will arise before a repository becomes available. There are also a number of possible options for the development of interim stores that were considered by CoRWM, and each of these would have implications for Copeland Borough Council's nuclear policy. These options are:

1. *Local or regional stores for ILW.* Given that a large proportion of the ILW being generated comes from the decommissioning of reactors at each of the sites, transport of this waste could be minimised (at least in the short term) by storing the waste at or close to the place of its arising. This would require that several stores would need to be constructed around the country. When a repository is finally sited and constructed, these wastes could then be transported for final disposal.

   In this option, Copeland would certainly need to host stores to contain the existing waste and the wastes due to be generated by the continued decommissioning of the Sellafield and Windscale sites. Note that certain wastes from elsewhere in the country (e.g. most fuels materials) would still need to be transported to Sellafield for processing or conditioning, and the products will continue to be stored on the Sellafield site.

2. *Centralised stores for ILW.* In this option, only a single interim store for ILW would be constructed and all wastes would be sent to it from the decommissioning sites for storage, until such time that repository is finally sited and constructed.

   The siting of a national ILW store could follow broadly the same process as siting of the repository and could involve the whole country, only a small number of cooperative local communities, or it could be focussed directly on Copeland on the basis that most of the waste is already stored there.

Note that the decision making process needed to build new stores could be different to that required to site a national repository and, therefore, the role of Copeland Borough Council could be different too. As an example, new stores are already in the process of being sited and constructed on the Sellafield site without

the council having any substantive role in the process and without the power of veto, and without the accrual of any community benefits.

The NDA currently has responsibility for the development of interim ILW stores. As laid out in their strategy, they propose to evaluate alternative approaches to ILW storage including:

- whether to have a local, regional or national interim storage solution, including storage at either:
  - every site;
  - Dounreay, Sellafield and one of the southern NDA sites;
  - Dounreay and Sellafield; or
  - Sellafield alone.

- whether to use existing infrastructure for a proportion of the required storage capacity or to build new stores; and

- whether to build interim stores on a generic or bespoke basis.

Note that with regard to location, Sellafield is identified as a possible site in each of the alternative approaches being considered by the NDA.

3.3 Coherent strategies for waste management

It is evident that the implementation of a coherent strategy for management of the UK's ILW and HLW must combine one of the options for siting a repository with one of the options for siting an interim store. There are several permutations for how this may be done but a key consideration is the relative timing between wastes arising on site and the availability of a repository.

CoRWM laid out an indication of the timescale they thought was appropriate for the implementation of a repository programme. This suggested that a preferred site may be identified by 2035 and, following a decade long period for gaining permissions and for construction, a repository would be available to accept wastes in 2045. This timeline is indicated in Figure 1 together with schedule information from the Magnox site's lifecycle plans.

This 2045 date for an operating repository corresponds in broad terms to the times indicated in each of the Magnox site's lifecycle plans at which ILW would first need to be transferred to a repository. The operational phase of repository is noted as 65 years. The current lifecycle plans, however, envisage ILW being transferred from sites solely during the initial period of repository operations. This may not be practicable because of the availability of infrastructure (e.g. transport containers and rolling stock) and because of the rate limiting handling capacity of the repository. Phasing of waste transfers from storage to a repository over the 65 year time period is likely to be required and the design life of the interim stores may need to be reviewed to ensure it is adequate.

Consideration may also need to be given over the longevity of the conditioned waste forms. It should be noted, however, that these lifecycle plans are currently based on an assumption of a long period of care and maintenance, with final site clearance being achieved around 100 years into the future.

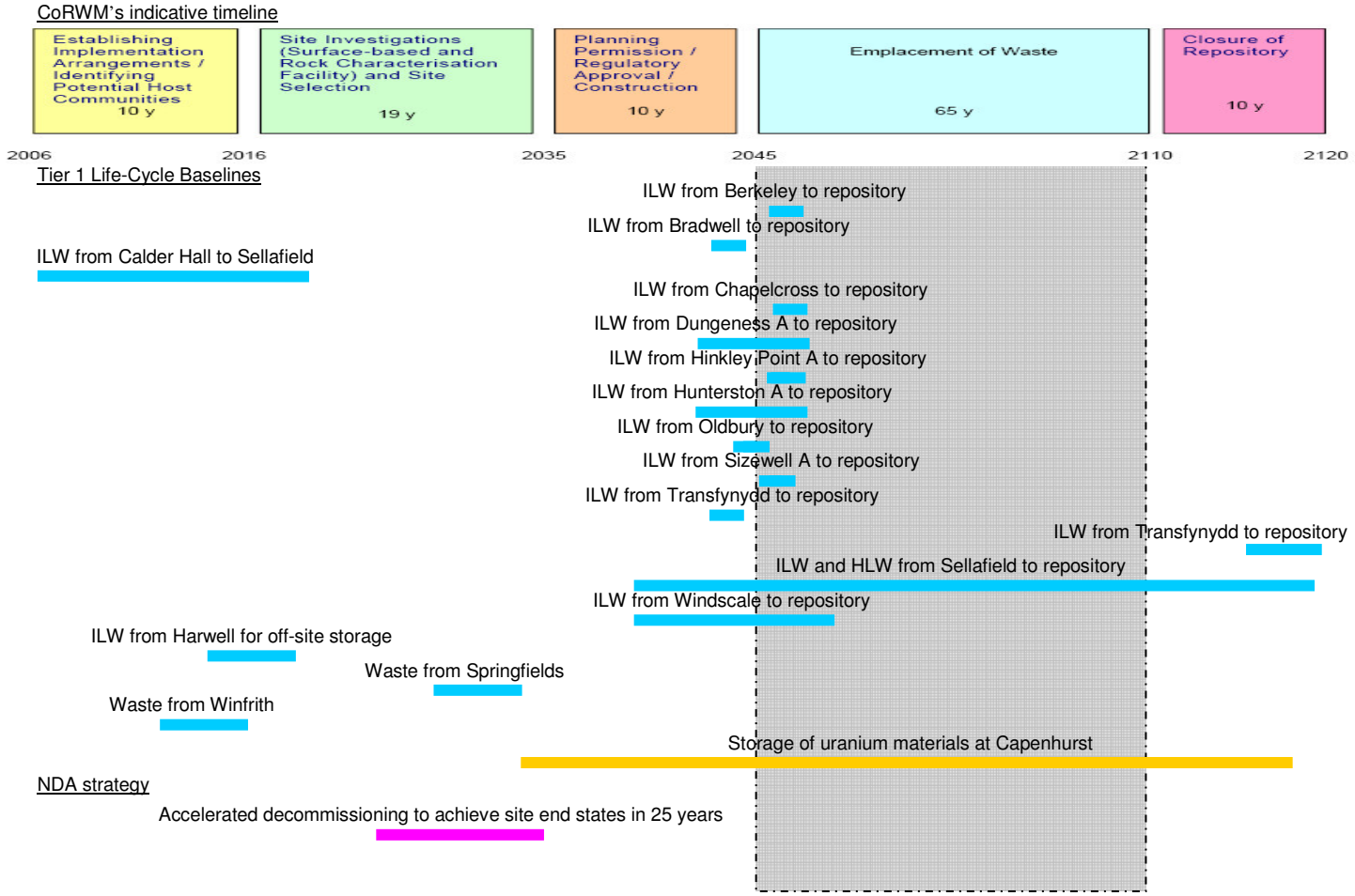

Figure 1: Comparative timescales for waste management events from different sources.

In the NDA's strategy document, however, the NDA put forward a proposal to accelerate the decommissioning of the Magnox sites in around 25 years compared to the 125 care and maintenance programme. The NDA is now in the process of developing a business case for achieving this. A direct consequence of an accelerated decommissioning approach would be that ILW (and other) wastes would arise on these sites around 20 years before CoRWM estimates a repository would be available in which to dispose of these wastes.

In parallel with planning for Magnox decommissioning, the NDA is working on plans to identify site end-points and site end-states. The NDA's Strategy set out reference decommissioning timescales and end-states for each site, and these are now being developed further. For most of the sites, the reference end-state is removal of all contamination, wastes and above ground structures so that the site can be delicensed for alternative reuse. Such an end-state is incompatible with the siting of interim waste stores which may provide a further constraint on future planning.

The various timings suggested by CoRWM, NDA and the site lifecycle plans are indicated graphically in Figure 1. It is clear from this diagram that if the NDA pursue an accelerated decommissioning programme, then most decommissioning ILW will arise before a preferred site for a repository has been identified. If, however, current lifecycle plans are adhered to, then this decommissioning ILW will arise after the preferred site has been identified but before a repository is operational

Given these uncertainties in the timings of events, a couple of potential strategies for ILW and HLW management in the UK present themselves.

A. *A nation-wide siting strategy.* If a national siting process for a repository is to be followed, it would be sensible for the ILW stores to be sited locally or regionally because this would minimise the initial transport of waste and avoid the need for 'double movement' after a repository becomes available.

   Although the whole of the UK might be considered for the location of the repository, the avoidance of 'double movement' of wastes will mean that the local or regional waste stores would need to be sited at or close to the sites of waste arising. In the initial stages, Copeland would remain as a host for the wastes stored and arising at Sellafield and Windscale, and would remain as one potential site for the national repository.

   It may be anticipated that this strategy would take the longest to complete because of the scope of the repository siting programme, and would require the largest number of individual storage facilities to be sited, constructed and operated.

B. *Nuclear community focussed strategy.* This strategy differs from the nation-wide strategy because the site for the repository would be selected from existing nuclear communities rather than from the whole of the UK. There would remain uncertainty about the final site of the repository and, therefore, it may still be sensible for the ILW stores to be sited locally or regionally to avoid the need for 'double movement' of waste after a repository becomes available.

   With fewer areas to consider for the siting of the repository, it might be considered that this strategy could be completed more quickly than the nation-wide strategy but the same number of facilities would be required.

C. *A 'Copeland first' strategy.* In the 'Copeland first' strategy, only the area around Sellafield would be considered for the siting of the repository. Given that the broad siting decision is made up front, it may be sensible for a single national ILW storage facility also to be sited in Copeland because this provides for the fastest means for the removal of wastes from the other sites and also limits the overall transport necessary.

It might be anticipated that this would be the quickest of the strategies because only one community needs to be considered for the repository and only a single centralised waste storage facility needs to be sited, constructed and operated.

There would, however, be some risk in this strategy if the wastes are transported for storage in Copeland before the exact site for the repository is agreed and approved.

3.4 Responsibility for implementation of a national strategy

It is clear that a coherent strategy for the management of the UK's ILW and HLW must combine consideration of the siting a repository with consideration of the siting of an interim store.

The Government has announced that the NDA and will oversee the full cycle of radioactive waste management in the UK, and will be responsible for managing storage and disposal of ILW and HLW (as well as LLW). The bringing together of all responsibilities into a single body may bring the benefit that the processes that may be followed for deciding on such things as siting, land use planning, veto and community benefits etc. in relation to the two facility types should be consistent.

Copeland Borough Council however has concerns that there may a conflict of interest regarding funding if the NDA have responsibility for all aspects of decommissioning and waste management. This is because there are four key elements which may affect Copeland and may attract funding in the form of:

– support regeneration following decommissioning;

– community benefits in relation to the building of new stores;

– socio-economic benefits associated from continued operation and eventual closure of the LLWR; and

– community benefits in relation to repository development.

The responsibilities of the NDA span all these four areas and Copeland believe it is important that each funding element is dealt with independently whereas the NDA may attempt to deal with the four funding elements in aggregate which may result in an overall reduction in funding.

3.5 Implications for Copeland Borough Council's Nuclear Policy

1. In all likely scenarios, decommissioning wastes will need to be stored for some years until such time as a repository becomes available. Current schedules for waste arisings from the NDA and Magnox, are not consistent with timing of the repository development as indicated by CoRWM, and

therefore there could be a lack of planning for waste storage and then waste transfers to the repository.

2. Currently, all the thinking on implementation with regards volunteerism, veto and community benefits (e.g. by CoRWM and NuLeAF) has been in the context of repository development, and it is not clear that they would be applicable to any future plan to site, build and operate interim waste stores.

3. Copeland Borough Council may wish to lobby Government to ensure that planning for waste stores is directly linked to the planning for a repository, so that the UK has a coherent waste management plan, and that the concepts of volunteerism and community benefits are equally applicable to the siting of both types of facility.

4. In the absence of any information on where a repository is to be sited, it makes sense to build a number of local or regional waste stores close to the site of waste arisings, so as to minimise transport and avoid 'double movement' of waste from a store to a repository. In a 'Copeland first' strategy, however, it would be possible also to site a national waste store in Copeland as well as the repository, and still ensure the benefits of minimised transport.

5. As the majority of waste is in Cumbria, Copeland Borough Council believe they need to be part of the decision making process and with this in mind the Council has responded positively to the invitation from Government to local authorities to register an interest in participating in the process.

4. DECISION MAKING PROCESSES

It is clear that both a repository and waste storage facilities need to be sited to enable a waste management strategy to be implemented. It is possible that the decision making processes for siting of the two types of facility could be disconnected from each other and work in different ways, or they could be explicitly joined as part of a coherent overall plan.

4.1 Decision making for a repository

With regards the decision making process for the siting of the repository, it is considered unlikely that Government would want to abandon the MRWS process, given that is has broadly been successful and has achieved what was intended so far. The MRWS process provides a framework for moving forward but it does not, however, spell out the details of how decisions should be made and implemented, particularly with regard to gaining approvals on such things as site selection, land using planning and waste disposal authorisations.

4.1.1 Repository siting

In terms of site selection, CoRWM has recommended a nationwide consultative process (Option 1 in Section 3.1) that adopts the concepts of volunteerism, veto, community benefits and partnership. This approach has the advantage of being completely open and transparent, and allows engagement by all stakeholders and members of the public, and thus is likely to engender confidence in the decision made. It is also slow, potentially cumbersome and, on the basis of international experience, likely to result in a short list of only a small number of existing nuclear communities.

An alternative to a nationwide site selection process would be a focussed process that still maintained an element of volunteerism but looks only at existing nuclear communities, or only at Copeland. Such a focussed approach would lack the inclusiveness of the nationwide process but, provided there was evidence of a willingness to participate from the nuclear communities, is likely to achieve the same result.

There are some potential advantages and disadvantages associated with a focussed process, with regard cost and timescales and these are discussed in later sections of this report.

4.1.2 Land use planning

A difficult issue for Government and for local authorities is to align the siting of facilities of national strategic importance with local decision making and the land use planning system. There are numerous cases of major infrastructure developments (e.g. roads, runways, windfarms etc.) that are opposed by local communities and the local authority but are approved by Government following public inquiry and substantial delay. For example, the Sizewell B nuclear power station took 73 months to secure planning permission. CoRWM's recommendation that the siting of a repository should be based on the concepts of volunteerism, veto and community benefits is an attempt to resolve this difficulty. In a two tier authority such as Cumbria/Copeland, further difficulties can arise because the potential volunteer community (Copeland Borough Council) is not the same as the relevant local planning authority (Cumbria County Council), and the two authorities may hold divergent views on proposals for new waste management infrastructure.

Government has signalled that it intends to change the land use planning system for the siting of facilities of national strategic importance, so as to speed up the decision making process. One consequence of this is that the role and importance of the local planning authority is likely to be much reduced within the overall decision making process. How this may be done in the context of the siting of interim waste stores or a repository is not yet clear but it is probable that Government will adopt similar approaches to that it has proposed for the siting of new energy facilities, as laid out in the 2006 Energy Review[12]. The broad thrust of how this will work is given in the following statement from that review:

> *"The UK needs a planning framework for energy projects that takes account of both national and local issues, reaches timely decisions and provides more certainty of the duration of the process, while allowing the public to participate properly in the system."*

Also included in the Energy Review is a consultation on the policy framework for new nuclear power stations. This states that:

> *"A policy framework for new nuclear build should be developed. It would include a nuclear 'Statement of Need' and set out that national strategic and regulatory issues are most appropriately discussed through processes other than the planning inquiry. The planning inquiry should focus on the relationship between the proposal and the local plans, and local environmental impacts. The inquiry should address these issues in the context of the national strategic or regulatory material considerations, which will already have been established. The inquiry should also examine the local benefits of the development and how specific local impacts of the construction and operation of the plant can be minimised."*

The basic land use planning framework that this implies is indicated in the flow diagram in Figure 2.

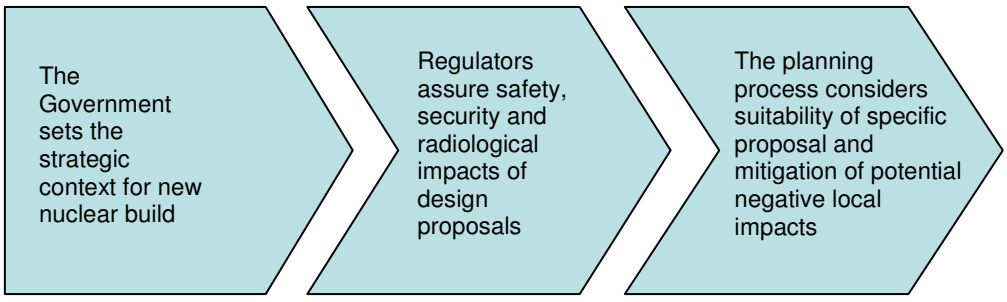

Figure 2. *The basic stages in a revised planning process for new build power reactors.*

It seems very likely that a similar statement of policy and land use planning framework will be produced by Government in relation to the planning for a repository but this would need to allow for the inclusion of community volunteerism in the repository siting process. A possible land use planning framework for a repository could therefore look like that laid out in Figure 3.

12 The Energy Challenge. Energy Review Report. DTi July 2006.

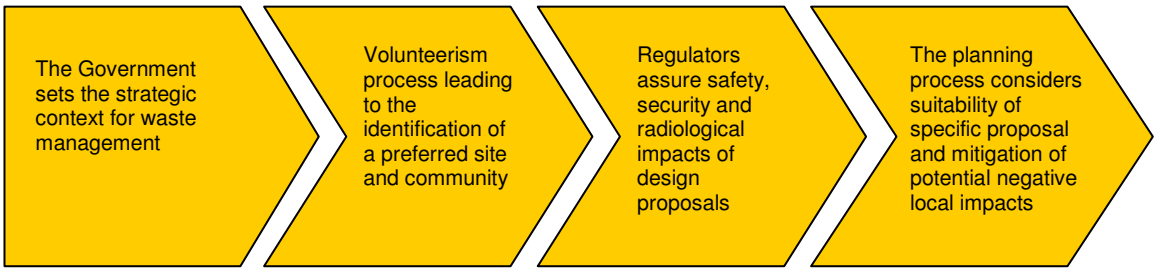

Figure 3. *The basic stages in a potential planning process for a repository.*

Assuming this to be the case, what this will means in terms of opportunities for engagement by Copeland Borough Council (and Cumbria County Council) in the overall process would be:

Stage One: It would be expected that there would be a public consultation associated with the Government setting the 'strategic context' for waste management in the first stage of the process. This would relate to Stage 3 of the MRWS process (Figure 1). During this consultation all members of the public and stakeholders, including the councils, would be able to engage.

Stage Two: Copeland would decide whether or not to volunteer to host the repository. Whether or not this is in response to an open call from an implementing body or through direct dialogue with Government will depend on whether Government chooses to embark on a nationwide site selection process or one that focusses only on a few nuclear communities or only Copeland.

Stage Three: A significant change implied in this process compared to current arrangements (and that followed by Nirex leading to the RCF inquiry) is that the regulators would become engaged in the process at a much earlier stage than before and would be expected to make a preliminary determination on the safety of a repository before a public inquiry gets underway. It will not be possible for the regulators to make a final determination until such time that all of the site specific information is available (e.g. on subsurface groundwater flow) but they should be in a position to make a preliminary determination with conditions and limitations attached.

The mechanism by which this happens is not clear. Under current arrangements, when making formal determinations the regulators allow for a period of public consultation. This could happen both at the preliminary determination stage and at the final determination stage (after all site characterisation and safety case work has been completed). Tied with the regulators' approval could be the EIA process, in which consultations with both statutory consultees and the wider stakeholder and public is required.

Stage Four: The public inquiry will only be in relation to local issues. As such, a public inquiry would not be able to engage in debates on the national need for a facility or the safety of it, as was the case in the RCF inquiry. Copeland would be expected to play a full part in the inquiry process.

CoRWM recommended that a repository should ultimately be developed by a partnership between the implementing body and the local community, likely in the form of the local authority. In this case, the inquiry process may be complicated if the local authority both represents the proponent and the planning authority, although this is not likely to be the case for as long as Copeland/Cumbria has two tier local government.

Copeland Borough Council have responded to the Government consultation on the policy framework for new nuclear build. In their response they expressed strong support for the involvement of potential host communities in participating in planning enquiries for nuclear power stations whilst supporting the action to address some of the generic nuclear issues prior to specific nuclear proposals are considered through the planning system.

4.2 Decision making for interim waste stores

Little consideration seems to have been given by Government to the decision making process that would lead to the development of interim stores, either a central store or a number of local or regional stores, in comparison to the thinking applied to repository implementation. Although not stated by Government or the NDA, it might be concluded that they anticipate new waste stores will be sited under current planning arrangements and no new specific planning framework is needed.

There is considerable precedence for this in so far as all waste stores currently being built now at Sellafield and at some of the power reactor sites were all sited and approved under the normal planning regime. This suggests that periodic decisions to build individual stores remain low profile and not be considered sufficiently strategic to warrant a change to the system.

If, however, Government embarks on a national programme to build a whole series of waste stores with an intended lifetime of 300 years (as indicated in CoRWM's storage options), then this may have such a high profile with the media and stakeholders that it would need to be treated in the same manner as for a repository.

4.3 Implications for Copeland Borough Council's Nuclear Policy

– As yet there has been no announcement from Government on what decision making processes would be applied to the implementation of either a repository building programme or new waste stores. As a result, it is not clear what formal role either Copeland Borough Council or Cumbria County Council will have in terms of volunteering and veto, or in the land use planning system.

– Proposed changes to the land use planning system with regard to energy infrastructure, may, however provide a guide to the proposals Government may announce for radioactive waste management facilities. If this is the case, this would reduce the effort (and hence time) for such applications to be determined but would also limit the influence of Copeland Borough Council and Cumbria County Council.

5. FINANCIAL COSTS OF STORAGE AND DISPOSAL

As yet, because firm proposals for the management, storage and disposal of ILW and HLW have yet to be presented, there is considerable uncertainty on the likely costs and timescales.

As part of their work to compare options, CoRWM did develop a number of cost estimates, presented in a Criteria Discussion Paper on the topic[13]. That paper represents the most recent summary of the relevant information but is itself subject to considerable uncertainty and based on numerous assumptions. Furthermore, the CoRWM storage options that were costed were based on an assumed 300 years period of storage, rather than the likely shorter periods (< 100 years) that seem necessary for interim storage before a repository becomes available, estimated by CoRWM in 2045.

It is inevitable that the high costs of storage and disposal presented by CoRWM will now be scrutinised by the NDA in their role as implementer for ILW and HLW management in the UK, and they will seek to reduce costs and timescales, and to contract out much of the hands-on management and operations work, in line with their approach to site decommissioning.

5.1 Development costs

The financial costs associated with development of a facility for storage or disposal including licensing and planning were addressed in the CoRWM discussion paper. These costs include both capital expenditure and operational costs, and these include tasks and events such as:

– *Research and development costs* including the costs involved in selecting and characterising the site. Site characterisation is predicted to be a major component of development costs, particularly for a repository.

– *Regulatory costs* will be incurred throughout the lifetime of the facility and will depend on the frequency of regulatory intervention and the level of regulatory interaction required. It is predicted that regulatory effort and costs will be greatest in the earlier period of the facility lifetime.

– *Application costs* include all costs associated with preparation of regulatory applications, and include applications relating to land use planning, safety and environmental protection regimes.

– *Stakeholder consultation costs* include costs associated with engagement of both statutory and non-statutory stakeholders.

– *Public relations costs* tend to be optional costs associated with maintaining reputation and brand management.

– *Public inquiry costs* relate to planning inquiries however it is noted that changes to planning procedures are currently under consideration with a view to minimising planning inquiry burdens.

Certain of these costs would be met by Government and the NDA, and others would be met by other stakeholders such as the regulators and the local authorities.

13 Crawford M and Wickham S (2005) CoRWM Criteria Discussion Paper: Cost

There may be some costs that can be avoided or reduced if an accelerated decision based on a single volunteer site were adopted by Government. These potential savings would include:

– *Research and development costs* of selecting the site would be reduced although the costs of site characterisation would potentially remain the same.

– *Regulatory costs* are likely to be of a similar order excepting for any input the regulator may have into site selection.

– *Application costs* of preparing regulatory applications are likely to be similar for the accelerated and standard process. These costs are likely to be as a result for applying for permits, carrying out SEA or EIA as required and planning applications. Costs for preparing an application for a LLW facility range from £15,000 to £3.5m in various counties (NEA). It is highly likely the cost for permits for an ILW or HLW facility would be greater.

– *Stakeholder costs* could be reduced because consultation would be focussed on only a single community.

– *Public inquiry costs* may be avoided by volunteering and costs could therefore be averted. If changes to planning law similar to those in the Energy Act relating to new build were put in place then the planning process may be streamlined. The cost of a four week long public enquiry for an underground hazardous waste facility carried out recently was £800k, the Sizewell B inquiry cost £25m in 1987 and the Nirex RCF inquiry cost £10m.

– *Transport costs* are not a development cost but have been presented as such because they could be a key differentiator between the centralised storage option and the option relating to storage at current locations. Transport costs would also be relevant for the deep geological disposal option.

5.2 Cost estimates for implementing storage and disposal

In a summary paper on cost issues by Gordon MacKerron for CoRWM[14] a number of relevant comments on cost estimates were made that address why they are uncertain. These include:

– No commercial long-term waste management facility for higher activity wastes has yet been completed anywhere in the world, and there is therefore no historical record as a direct guide to costs that will be incurred in the UK.

– A minimum requirement for costing waste management facilities with any degree of accuracy is a detailed design of the facility, and this does not yet exist.

– There may be cost escalation due to a need to meet regulatory standards. As the historical trend has been for such standards to become more stringent over time, the risks of significant escalation are high.

Considering all of the uncertainties, and using a number of assumptions, such as new stores will have a common design based on the existing encapsulated product store (EPS) at Sellafield, a range of cost estimates was developed for the CoRWM

14 MacKerron G (2006) Note on costs. CoRWM Paper 1564.

options. Those costs for storage and disposal that are relevant to this paper are presented below. All of these costs are presented at present day values and do not assume any discounting over time. More details of the cost breakdown are given in Appendix B.

Table 4: *Estimates and ranges of costs for storage and disposal.*

Option	Cost Range (£ billion)		
	Low	Central	High
Above ground storage, centralised and protected	10	12	17
Above ground storage, at the site of waste arisings, protected	12	20	30
Geological disposal (repository)	10	11	18

It needs to be recognised that these options are not true alternatives because the storage options are assumed to last for 300 years, after which another option must be implemented, the cost of which is not included here.

Closer examination of the calculations underpinning these ranges indicates that a substantial element of the cost of the storage options is associated with the institutional control for 300 years (e.g. ongoing protection and regulatory effort to maintain safety and security). For example, the cost of security for the 'at the site of waste arisings' storage option is around £800M for 300 years (i.e. a just over £2.5M/year).

5.3 Implementation focussed on existing nuclear communities

The costs estimated by CoRWM are based on the assumption of a national siting programme involving volunteer communities and extensive public and stakeholder engagement (Option 1 in Section 3.1).

There are, potentially, costs that could be averted or reduced if the siting programme focussed only on nuclear communities (Option 2 in Section 3.1) or directly at Copeland (Option 3 in Section 3.1).

The types of costs that might be reduced are largely related to site investigation work, and regulatory and stakeholder issues. This is because the siting process is likely to be more streamlined and the number of stakeholders may be self limiting. It is possible that a programme which focuses on nuclear communities could be a programme for centralised storage or storage at current locations. It is highly probable that a programme for centralised storage, whilst it may consider non-nuclear communities, would be more acceptable to an existing nuclear community.

5.4 Community benefits

In the methodologies being used to site hazardous waste facilities there has a been a move away from the centralised, top-down processes of the past and towards those in which the public is more involved.

Work from around the world has shown that an important safeguard generally offered to potential host communities is that the community should not find itself worse off than before the process began. This has in turn led to the development of a number of so-called 'impact mitigation' measures. Not least amongst these has

been the offering of specific benefits packages to the community, by way of compensation, not necessarily for bearing an increased risk, but simply for allowing itself to be considered.

The actual benefits involved can vary from the purely financial to the social and institutional. In some cases cash benefits are offered solely as an incentive to encourage participation in the process in the first place, and can either be paid right at the beginning, with no controls on how they are spent, or they can be offered as a guaranteed future payment, only available if a facility is eventually sited. In some cases details are only made available prior to a final referendum or community decision, which can of itself cause confusion and severe local disruption.

There are a number of different costs, both financial and social, which may be incurred by a community voluntarily entering into a siting process. There are the simple costs of informing the local population about the intention to become involved, including newsletters, information sheets etc., which are a crucial part of the 'openness and transparency' now associated with volunteering of whatever kind. These are nearly always paid for by the organisation which hopes to site the facility, and are in general not subject to any negotiation or discussion.

In many cases, at the beginning of a process, the local community government or council simply requests reimbursement of any costs incurred. As the process develops it is usual for a series of specific funding packages to be introduced to allow development and operation of local review and monitoring groups, again usually operating within a fixed budgetary framework, and forming part of an expanding set of measures specifically designed to enable or empower the community to take an active part.

There are various actual and perceived costs to a community in taking part in a siting process which can be summarised as increased social and public service burdens (added strain on roads, schools, police etc.) and costs resulting from the stigma of being a potential or actual host. These may also include such things as declining property values, reduction in population influx, effects on tourism, emigration of concerned individuals and businesses etc.

These costs are less open to direct monetary compensation, which can in itself actually cause conflicting results. For example, if local people are directly recompensed for a possible future decline in property values, it can become a self-fulfilling prophecy as property values drop, because buyers are harder to find from outside the community due to the apparent admission by the authorities that there will indeed be a local impact from the facility. These costs are more suitable to other methods of mitigation, such as information dissemination, public meetings, formation of review groups etc., designed to convince the members of the community that their fears in these areas are unfounded.

Other potential and actual costs to a host community are more readily mitigated. For example, during the site investigation and facility development stages there is usually an increased burden on local infrastructure, especially roads, police etc., which increases during the operational phase, with additional burdens on housing, schools, hospitals etc. In many cases these can be directly mitigated by improvement of existing facilities, or even by the provision of wholly new ones, the benefits of which will remain even if the community subsequently withdraws from the process.

Some national programmes include enhancement of local infrastructure as major components of an introductory incentive package, designed to either attract

potential volunteers or persuade a community to allow work to continue, and most if not all include this in long-term measures also, which would only be available during facility lifetime. In addition to these, payment of local taxes, guarantees regarding employment of local people, support of local service industries etc. can all form important parts of both the incentive and social benefits packages.

5.4.1 Community benefits and repository options

With regard to community benefits, CoRWM made the following recommendations to Government. In particular:

– Recommendation 10 states that '*Community involvement in any proposals for the siting of long term radioactive waste facilities should be based on the principle of volunteerism, that is, an expressed willingness to take part'.*

– Recommendation 11 expands on this and says that *'Willingness to participate should be supported by the provision of community packages that are designed both to facilitate participation in the short term and to ensure that a radioactive waste facility is acceptable to the host community in the long term. Participation should be based on the expectation that the well-being of the community will be enhanced'.*

5.4.2 Community benefits and storage options

CoRWM state that storage is an important and integral element of their recommendation. Storage is the only option available in the short and medium term and the NDA is responsible for the safe and secure management of the majority of the existing stores.

However CoRWM have stated that *'In principle, CoRWM proposals for implementation, including the development of partnerships supported by community packages, should apply to new central or major regional stores at new locations. The extent to which they should be applied to other new stores and changes to existing stores is a matter for further consideration'*.

Government has not yet indicated whether they would make substantial community benefits available to communities that host stores, and whether it would depend on the nature of the stores built. Stores recently built or in the planning stage have not involved the payment of community benefits.

5.5 Implications for Copeland Borough Council's Nuclear Policy

– The actual long-term costs of waste management based on interim stores and a repository are poorly defined and subject to considerable uncertainty. The costs developed by CoRWM for each of their options are subject to ranges of several billions of pounds. Furthermore, their cost estimates for storage options are based on a 300 year storage period and do not include the cost of post-storage disposal.

– Within the total waste management costs, and in particular interim storage, it is not easy to identify any precise estimates of the costs that could be saved through centralised management rather than placing stores at the waste producing sites. That said, it is evident that the centralised approach would be cheaper because fewer sites need to be assessed and protected.

– Similarly, it is not easy to identify precise estimates of the costs that could be saved through a siting programme that focussed only on the existing nuclear sites or directly on Copeland, as opposed to a national siting programme. Again, however, it is evident that a focussed siting programme would be the cheapest. This is largely due to the need to maintain site security and for regulatory support for multiple sites, rather than a single site, over extended periods of time.

– Costs to Copeland Borough Council for participating in any decision making process could be considerable. The principal costs are likely to be associated with the provision of appropriate manpower to participate in the process. For example, the costs borne by Copeland and Cumbria councils directly associated with the activities undertaken by Nirex including the RCF enquiry were in the region of several million pounds. The types of technical areas where resources may be required include in-house staff costs, costs associated with appointing consultants, and costs relating to obtaining legal advice and opinion.

– The requirement and arrangements for cost recovery relating to these additional costs has not been addressed. This may be an issue that Copeland Borough Council would seek to address with Government and the NDA because, in any event, Copeland must be seen to be part of the implementation of any waste management solution.

– The storage costs presented in the CoRWM papers for an option based in 300 years of storage do not appear to be directly relevant to the shorter periods of time anticipated between decommissioning and a repository becoming available (< 100 years). Currently the NDA are advocating early and prompt decommissioning with waste being produced well before the repository will be available and hence the need for interim storage. It is conceivable however that if decommissioning were delayed for around 50 years or so when the repository is likely to be available waste could be disposed of directly without the need for the provision of interim storage for the whole UK inventory of HLW and ILW. This could avert some or all of the cost of building interim stores. The potential cost saving however needs to be set along side the policy requirement for passive safety, early decommissioning to release sites for re-use, the political pressure to be seen to be addressing the problem and not leaving it future generations and the opportunity to use currently available skills and knowledge.

6. CONSEQUENCES OF DELAY

All major projects are at risk of delays that can be caused by a number of events such as poor planning, financial overspends and technical difficulties. Large national infrastructure projects can also be delayed due to political considerations, stakeholder opposition, and regulatory procedures including public inquiries.

With regard to the management of radioactive wastes, and the development of facilities to store or disposal them, there are three key events in the implementation process that could be subject to delay:

– site decommissioning and waste treatment;

– bringing on stream new interim storage capacity in which to hold wastes prior to a repository becoming available; and

– siting, construction and operation of a repository for the final disposal of wastes.

To some extent, a delay in anyone of these events can have a knock-on effect on the others. For example, delaying the construction of new interim stores may result in a slow down in site decommissioning and waste treatment because many sites have only limited capacity to store the wastes they generate on site.

Delays to each of these events will result in different types of consequence, and with different significance. These main ones are discussed below.

6.1 Delays in site decommissioning and waste treatment

Most obviously, delays in particular site decommissioning activities may mean that the overall site clean-up schedule can be put back because it is usual that facilities and buildings need to be decommissioned in a particular order (e.g. because of their physical interconnections or reliance on each others capability).

A direct consequence of delays in the decommissioning programme is an increase in the total decommissioning and waste management costs because of extended periods of control and active management. Ultimately it is the taxpayer who will be responsible for meeting these increased costs but, at a local level, this may be offset but extended periods of employment for the present workforce.

Where on or off-site environmental impacts occur from past and present site activities (e.g. leaching from contaminated land), delays in the decommissioning programme may also mean a delay in environmental remediation.

The NDA has set out indicative timescales for site decommissioning but some of these are still subject to considerable uncertainty, particularly with regard to the Magnox reactors where alternative plans are prompt (c. 25 years) decommissioning and extended periods of care and maintenance (c. 120 years).

An issue of particular concern is the potential for delay in the treatment of high-activity (high hazard) wastes in store or new arisings. The NII expects sites promptly to treat wastes so as to reduce hazard, and considers highly radioactive liquids, sludges and dispersible powders to present the highest hazards. In 2000, the NII issued a notice on the Sellafield site requiring them to reduce the volume of high active liquors (HAL) stored in the B215 tank complex from 1500 to 200 m^3 by

2015. These liquids are to be vitrified in the waste vitrification plant (WVP), with line 3 having come on stream in 2001, and BNG projections are that this target will be achieved.

Failure to treat wastes promptly means that high hazards are maintained for longer, presenting greater risks to workers, the public and the environment from a failure in containment, as well as delaying the decommissioning programme and increasing decommissioning costs.

The timing of waste arisings from decommissioning, and their subsequent treatment, affects the time at which new waste storage and disposal facilities will be required. Clear policy and programmes for decommissioning must be established so that decisions can be made on the nature, capacity and location of future waste management facilities. Lack of clarity on this issue means that:

– some high hazard materials remain untreated;

– decommissioning programmes and costs increase; and

– stakeholder concerns (e.g. on where new facilities will be sited) remain unaddressed.

6.2 Delays in storage capacity becoming available

The UK is facing an acute shortage of storage capacity for certain radioactive wastes. Most urgent is the need for additional capacity for LLW given that the LLWR is expected to be full by mid-2008. Also, there is a considerable shortage in ILW storage capacity, as indicated in Section 2.3.

This is arguably the most important issue the UK nuclear industry faces because the decommissioning programme cannot proceed as planned without new storage capacity becoming available. Thus this issue presents considerable project risk to the NDA for achieving the programme set out in its Strategy document.

A direct consequence of existing storage capacity becoming full is that the waste producing sites will have to store wastes on site (or on nearby sites if possible) or, ultimately, to stop generating wastes by ceasing decommissioning activities. Some sites do have additional storage capacity that can be used as an interim measure. For example, there is available capacity in ILW stores at Sellafield that potentially could be used to hold LLW when the LLWR is full and if permissions for further storage at that facility are refused. However, many sites have limited additional storage capacity (particularly the reactor sites) that can be used in this way.

The NDA is giving this issue urgent attention, and their Strategy document indicates they will assess alternative schemes for providing additional ILW storage capacity. Similarly, the consortia bidding to run the LLWR have been asked to present plans for how they would mitigate this problem with regards LLW.

It is clear that there is no ideal ‘quick fix’ for this problem. The time take to site, design, construct and licence a new storage facility will run into years. Different solutions with different time horizons are being considered:

– seeking permission to increase the capacity for storage at the LLWR, perhaps by moving forward with Vault 9 initially authorised as an interim store rather than a disposal facility;

– seeking means to increase short-term storage capacity at the waste generating sites, and with sites sharing storage capacity on a regional basis;

– seeking suitable non-nuclear sites (e.g. MOD land) that could be used to provide short-term storage (e.g. < 5 years) until longer term measures can be implemented; and

– undertaking a national strategic review of waste management and required storage capacity (type, location, period etc).

Fewer solutions are available for ILW storage than for LLW because of the greater requirement for ILW storage to be robust and secure due to its inherent higher hazard. That said, the urgency for additional LLW storage capacity is that much greater than for ILW.

Depending on a short-term (< 5 years) and longer term (5 – 20 year) solutions becoming available before a repository is sited and constructed, the potential consequences of this and any further delays in storage capacity becoming available are:

– knock-on delays to site decommissioning programmes if wastes cannot be safely stored;

– cessation of treatment and hazard reduction for certain high active liquids and sludges – note that these cannot be treated until such time as a suitable store is available to contain the treated product;

– an increase in the amount of waste stored on the nuclear sites without a designated disposal route;

– wastes potentially being stored at other non-nuclear sites (e.g. MOD sites) as an interim measure;

– additional transport, and double movement, of wastes as shipments are made between waste producers, short-term stores, and longer-term stores when these become available;

– continued risk to people and the environment arising from potential failure of containment; and

– substantially increased costs for active waste management and storage.

6.3 Delays in a repository becoming available

The most immediate effect of a delay in the repository becoming available will be that the period of operation of waste stores will need to be extended. If the delay extends beyond the design life of the stores, then considerable additional effort and expenditure would be required to build new stores or to refurbish the old.

Given that stores will have to have been provided ahead of the repository, it is unlikely that a delay in the repository becoming available would have a significant affect on the decommissioning programme, but it could potentially affect a programme of new reactor build. A related issue is, however, that the sites on which the stores are built cannot themselves be released from institutional control

until the wastes are removed to a repository and so a delay will affect the time at which the storage sites could achieve delicensing and planned end-points.

Another consideration arising from a delay in the availability of a repository is that the conditioned ILW and HLW wasteforms and packages may begin to degrade during storage. This issue is concerning the Environment Agency and they are in a dialogue with waste producers and Nirex, and are themselves undertaking review and research in this area. Of particular concern are the trigger levels at which repackaging may be required (e.g. what parameters should be measured and how should they be monitored) as well as the techniques for resorting and double-handling of the wastes. A simple approach may be to overpack the wastes thus minimising the potential for workforce exposure, the release of radioactivity and the generation of secondary waste streams from the process. However, an obvious disadvantage of such an approach is that the volume of waste requiring final disposal.

Extended storage of wastes thus extends the risk to people and the environment arising from potential failure of containment.

Storage of waste (especially of ILW that requires ongoing facility maintenance, robust monitoring and active security measures) is expensive, and so an increase in the storage time will also add considerably to the total cost of the decommissioning programme.

6.4 Implications for Copeland Borough Council's Nuclear Policy

1. A delay or slow-down in the decommissioning programme will increase the overall cost to the NDA and, therefore, may result in less money being made available to the local community because socio-economic plans are intended to be paid out of cost savings. This may affect implementation of the Cumbria Master Plan.

2. A delay in the siting and construction of stores and or a repository will mean that any community benefits that would accrue from engagement in the siting process and finally hosting the facility (such as proposed by CoRWM) would also be delayed.

3. A delay in the restoration of the Sellafield site could adversely affect further inward investment and local regeneration because it would contribute to a view that Government is not serious about clean-up despite the NDA.

4. A delay in decommissioning may mean that the anticipated reduction in employment could be slowed, thus maintaining a skilled workforce.

5. A delay in treating wastes and making them passively stable will mean that there is an extended period of risk to people and the environment from the potential failure of waste containment. This risk may be small but is real and is the reason behind the NII directing Sellafield to reduce the volume of high active liquors stored in tanks.

6. Overall, the most significant impacts to Copeland would arise from delay in the establishment of appropriate new storage capacity because this impacts on both the decommissioning programme and the reduction in hazard, and would defer the accrual of community benefits from hosting new waste management facilities.

7. FINAL CONCLUSIONS

1. Government accepts that geological disposal coupled with safe and secure interim storage is the way forward for the long term management of the UK's higher activity wastes. At best estimates, a repository will not be available until 2045.

2. Existing storage capacity is substantially less than that required to contain all of the ILW and HLW that is anticipated to arise. The total shortfall in capacity is around 290,000 m^3 which equates to around 16 new 'EPS style' stores if all waste stores were centralised or 25 if the stores are located at the sites where wastes arise. Given the large amount of waste arising at Sellafield, a minimum of 7 new 'EPS style' stores are estimated to be needed in Copeland if stores are built at the site of arising, or 16 if a centralised storage facility were located in the area.

3. The number of interim stores required could be significantly reduced if the decommissioning schedule was slowed down and, in particular, the Magnox reactors were managed through a 100 year 'care and maintenance' plan. In this case, many wastes would arise after the repository becomes available so they could be sentenced directly without a need for interim storage. The proposed NDA Strategy is, however, to achieve final site clearance for the Magnox reactors in 25 years. Under this proposal the maximum number of stores will be required.

4. There is an acute shortage of storage and disposal space for LLW and the LLWR is anticipated to be full by mid-2008. The NDA is urgently addressing this issue, and very short-term (< 5 year) storage solutions are being investigated, including seeking means to increase short-term storage capacity at the waste generating sites.

5. There is currently no information available on where new interim stores or a repository may be built. In the absence of any information on where a repository is to be sited, it makes sense to build a number of local or regional waste stores close to the site of waste arisings, so as to minimise transport and avoid 'double movement' of waste from a store to a repository. In a 'Copeland first' strategy, however, it would be possible also to site a national waste store in Copeland as well as the repository, and still ensure the benefits of minimised transport.

6. As yet there has been no announcement from Government on what decision making processes would be applied to the implementation of either a repository building programme or new waste stores. As a result, it is not clear what formal role either Copeland Borough Council or Cumbria County Council will have in terms of volunteering and veto, or in the land use planning system. It is also unclear yet as to whether community benefits would be payable for taking part in the decision making process or for hosting either a repository or a store.

7. The actual long-term costs of waste management based on interim stores and a repository are poorly defined and subject to considerable uncertainty. The costs developed by CoRWM for each of their options are subject to ranges of several billions of pounds. Furthermore, their cost estimates for storage options are based on a 300 year storage period which does not reflect the likely period of storage (< 100 years) required if a repository becomes available in 2045.

8. It is probable that centralised storage of wastes would be cheaper than storage at the waste producing sites because fewer sites would need to be licensed and protected over time. Similarly, it is likely that a siting programme focussed on a small number of nuclear communities would be cheaper than a national siting programme. In both cases, however, the date are too uncertain to provide precise estimates of the cost savings that could accrue.

9. Delays to the decommissioning programme potentially could affect key milestones such as (i) site decommissioning and waste treatment, (ii) bringing on stream new interim storage capacity, and (iii) siting of a repository. Any delay in the decommissioning programme will increase the overall cost to the NDA and, therefore, may result in less money being made available to the local community because socio-economic plans are intended to be paid out of cost savings. A delay in the siting of stores or a repository will also mean that any community benefits that would accrue from hosting a facility would also be delayed.

8. APPENDIX A: COPELAND BOROUGH COUNCIL WORKSHOP

A workshop was held on 24 August 2006 at the offices of Copeland Borough Council in Workington.

The workshop was attended by:

– David Davies, Head of Sustainability and Nuclear Policy

– Frank Duffy, Nuclear Policy Manager

– Tony Pomfret, Development Control

– Fergus McMorrow, Corporate Director

– Mike Titchford, Head of Regeneration

– Martin Jepson, Head of Legal and Democratic Services

– Elaine Woodburn, Leader of Copeland Borough Council

– John Hughes, Planning

The workshop was facilitated by Bill Miller and Julie Tooley of Enviros Consulting Ltd.

The aim of the workshop

The aim of the workshop was to discuss the following issues:

– Should Copeland volunteer if Government implements CoRWMs recommendations for a staged national siting process?

– Are any other communities likely to volunteer?

– What about an accelerated siting programme that begins by focussing Copeland – and perhaps a small number of other nuclear communities?

– What policy, legal, and regulatory hurdles would need to be overcome to allow an accelerated siting programme to be implemented?

– What are the risks and opportunities for Copeland and UK Government I Copeland volunteered and were either the only volunteer or the only in an accelerated siting programme?

The format of the workshop

The workshop took the form of an open discussion of six questions:

– Is Copeland likely to be able to provide a suitable site for a repository on scientific and other grounds, bearing in mind the issue and objections raised at the RCF Public Inquiry? How could this be demonstrated with sufficient confidence to allow an accelerated programme to continue?

– What evidence would be needed to demonstrate that the local community is broadly supportive of volunteering in an accelerated programme?

– What changes to law would be required to allow an accelerated programme to continue?

– What changes to the land use planning system and other decision making processes would be required to allow an accelerated programme to continue?

– What would be the main milestones and regulatory hold points in an accelerated programme and how would these differ from the CoRWM recommended process?

– Can a road map be drawn showing the main elements and timeline for an accelerated programme?

The outcomes of the workshop

Is Copeland likely to be able to provide a suitable site for a repository?

There was a view that in order to determine whether Copeland are able to provide a suitable site for a repository a Rock Characterisation Facility would be required. It was recognised that there would be merit in re-examining the RCF inquiry evidence to determine whether all the objections raised at the inquiry could be addressed by Copeland. It was noted that the demonstration of the suitability of a location if Copeland would potentially fall to NIREX and concerns were expressed relating to the public perception of NIREX. There are issues around whether the local community would support a Copeland only scenario and whether such a move would give the wrong impression about the Council to the community. to resolve this more information is needed on the type and scale of benefits. It was recognised that the due process for volunteering has not been decided. Additionally Copeland recognise that volunteering could involve significant resources in terms of money, time and staff especially as an independent review of existing information was recognised to form an important first step in the decision about whether to volunteer. It was also recognised that it is important to involve the community in the decision making process from the very start.

What evidence would be needed to demonstrate that the local community is broadly supportive of volunteering in an accelerated programme?

During the discussions it became clear that Copeland had decided not to pursue the accelerated programme as this was likely to send the wrong message and that Copeland preferred to benefit from the process set out in CoRWM's recommendations with respect to such things as the right to veto and participating in a staged process.

Copeland BC is currently developing a Nuclear Policy on which it intends to consult and this could be a vehicle to test the support of the local community. Whilst there is some evidence of broad support for a repository in Copeland there are issues around such things as the potential safety and environmental impacts, socio economic impacts and opportunities for partnership that such a development would bring. The Council is actively pursuing a policy of attracting jobs to the Copeland area and one aim is to attract jobs which contribute to a diversification away from nuclear industry dependant jobs. Issues such as whether there is a preference for attracting non-nuclear jobs as opposed to nuclear jobs to the area have not been fully considered as yet. Additionally it was felt that the broad community support

may be as result of a general acceptance within the community that it is almost inevitable that the repository would be close to Sellafield.

What changes to law would be required to allow an accelerated programme to continue?

It was felt that when a repository site was identified on technical and scientific grounds it is likely that some kind of legislative instrument would be required to set out the regulatory arrangements. There was a view that in particular a planning policy statement would be needed.

What changes to the land use planning system and other decision making processes would be required to allow an accelerated programme to continue?

The main issue raised was whether a Strategic Environmental Assessment (SEA) would be needed. SEAs are needed when plans or programmes are being developed and it is unclear whether the CoRWM process could feed into the SEA process. Copeland believe that an SEA should be carried out following the CORWM process. DEFRA are currently consulting on changes to the planning system which could support repository build as it aims to streamline the public inquiry process in terns of cost and time.

What would be the main milestones and regulatory hold points in an accelerated programme and how would these differ from the CoRWM recommended process?

The major milestones identified by CoRWM are:

– to identify host communities by 2016,

– to undertake site investigations by 2035, and

– to gain regulatory approval by 2045.

If Copeland or a small number of communities were to volunteer the identification of host communities could occur sooner and consequently bring other milestones forward. It was seen that removing uncertainties around host community issues earlier may be an advantage. The types of uncertainties that currently exist include:

– Will any host community volunteer?

– What should happen if only one community volunteers?

– If many communities volunteer what criteria would be used to short list communities?

– What happens if the power of veto is invoked in any of the previous scenarios?

It was felt that an accelerated process would not reduce the timescales significantly and is likely to reduce the timescales by around 10% i.e. 5 years.

Risks and opportunities

During the discussion key risks and opportunities were identified and these have been grouped into four areas:

– Due process issues

– Location issues

– Community issues

– Internal issues

– Other stakeholders

Due process issues

Power of veto: CoRWM's recommendation 13 states that 'Communities should have the right to withdraw from this process up to a pre-determined point'.

It is unclear how the power of veto would apply in an accelerated process. Additionally at this stage the point at which power of veto is lost has not been defined and this makes it difficult to rationalise the risks associated with volunteering. If the power of veto were to remain up until the appropriate legislative instrument were to be drafted then this would provide significantly more comfort to Copeland as a volunteer than if the act of volunteering resulted in them losing all power of veto.

MRWS process: MWRS sets out the due process for decision making on radioactive waste management. The UK is currently at the end of Stage 2 of this process which involved assessing and consulting on possible waste management options. CoRWM report on Managing our Waste Safely is the first output of that stage and will be used to inform the Government's decision. Stage 3 involves public debate on how the chosen option will be implemented including what decision making process will be adopted. The Government is due to respond to CoRWMs recommendations around mid-October 2006. The timing of any volunteering for an accelerated programme is key. There may be merit in Copeland waiting for the decision making process to be set out to enable the best case to be put forward both in terms of the potential resource saving to be gained from an accelerated programme and obtaining the best fit between the accelerated process and the MRWS process.

In the process set out by CoRWM a joint implementing body would be set up to implement the Government's decision. The implementing body would have a community element and a technical element. Such a body provides a mechanism by which the host community could influence decisions. Copeland would expect an equal community partnership which could be run by the Council.

Strategic Environmental Assessment: The relationship between the MRWS process and the SEA process is not yet clear. A ruling has not been made as to whether an SEA is needed and if so who would carry it out and when. It is foreseeable that in line with SEA process alternatives would have to be assessed. This would suggest that if an SEA were to be undertaken it would be carried out at the site selection stage. If a single early volunteer host community came forward with a suitable site it is not clear how the SEA process could be satisfied although the workshop felt that SEA could provide a vehicle for the decision making process.

Risks	Opportunities
Risk 1: There is insufficient information to determine if by volunteering at early stage in the decision making would result in the volunteer losing the power of veto.	Opportunity 1: Copeland could become the community part of the joint implementing body and influence the decision making process.
Risk 2: The final point of veto is unclear.	Opportunity 2: Self definition of the community would allow Copeland to control and ratify the process.
Risk 3: Early volunteering may be viewed as a deviation from the MRWS process.	Opportunity 3: SEA and EIA could provide a vehicle for the decision making process.
Risk 4: The order of events in the staged decision process is not clear.	
Risk 5: The requirement for an SEA is unclear and if one was needed who would undertake it and when.	

Location

Environment: The presence a geologically suitable site in the Copeland area has not been demonstrated and other environmental issues such as predicted coastal erosion would need to be taken into account. It would be necessary to demonstrate that issues and objections raised at the RCF inquiry in 1995/6 were no longer applicable.

Option vs. location: The MRWS and CoRWM work does not indicate which issue takes precedence – location or option. For example there could be one site which was ideal for a repository development and one site ideal for interim storage. If the interim storage site were close to the majority of the waste it is unclear as to whether this would be a more attractive solution than a repository site very distant from all the sites where waste is generated.

Proximity: Transport may be a significant differentiator in site selection. If for example the waste management option has been chosen it is conceivable that one site could be close to the majority of the waste which whilst environmentally acceptable it was not ideal. A second site could be ideal in terms of environmental issues but be very remote from all of the sites where waste is generated. It could be envisaged that in such cases undertaking a SEA would help determine which site was the best overall, recognising that as part of the SEA process some consideration would have to be given to the relative weightings attached to such issues.

It was perceived that proximity to the majority of the waste could be viewed as an opportunity for Copeland.

Risks	Opportunities
Risk 6: Is there a geologically suitability site within the Copeland area.	Opportunity 4: Proximity to the majority of the waste.
Risk 7: It is unclear which takes precedence - option selection or location	
Risk 8: Transport	
Risk 9: Potential coastal erosion may render areas of Copeland BC unsuitable	

Community views

Copeland BC intends to consult on its Nuclear Policy which is currently under development. Despite much dialogue with the community it represents the Council has not recently sought views on the separate specific issues of hosting a repository or interim centralised waste store and volunteering. Some form of clear and representative engagement would be needed to elicit the community's views and the timing and content of any such consultation would need to be carefully planned to avoid raising false expectations or causing unnecessary anxiety.

Risks	Opportunities
Risk 10: The views of the community to hosting a repository have not been tested formally particularly with respect to the specific issue of volunteering.	

Internal issues

The considerations which would need to take place prior to the decision to volunteer and the subsequent burden on the volunteer could be significant in terms of resources. If the Government were minded to consider an early volunteer community in advance of seeking other volunteers there could be scope for additional financial support from the Government arising from perceived cost reductions in the siting process, for example reductions in cots of stakeholder engagement and site selection. However the financial support would need to be made available to the volunteer host community before it had been determined that the volunteer host community had a suitable site in its area. Should a suitable site not be identified in the volunteer host community area it is probable that the financial support provided would have to be written off.

Risks	Opportunities
Risk 11: Copeland would face significant in-house resource demands if they volunteer and it is not clear if any additional support would be available.	

Other Stakeholders issues

Copeland BC stated in it's response to the CoRWM consultation that volunteering organisations should be a district level. However the interface and relationship with Cumbria County Council is important.

Risks	Opportunities
Risk 12: Cumbria County Council' s position may differ from that of Copeland BC	

Risks to Government

The MRWS process is aimed at progressing the UK's arrangements for managing radioactive waste. The workshop attendees felt that the risks facing the Government include:

– The inability to deal with waste now

– If the Government were minded to consider Copeland as an early volunteer it could be perceived as having 'all its eggs in one basket' and could also result in earlier spend.

– The possible conflict between the pressure for new build and decommissioning.

– The NDA's position as to whether interim stores attract benefits.

– Potential difficulties associates with the veto arrangements

– Opening up the process to a wider community may increase uncertainty

Potential volunteer host communities such as Copeland are looking to Government to set out more clearly how the CoRWM recommendations will be taken forward.

9. APPENDIX B: COSTS OF IMPLEMENTATION

The costs in this appendix have been extracted from the CoRWM Discussion paper on costs[15] which are subject to considerable uncertainty. These costs should be taken as indicative costs only.

Costs of siting a repository

Costs estimates were provided in the CoRWM criteria discussion paper relating to a repository for building:

1. A repository for ILW and LLW which is not suitable for disposal at the LLWR;

2. A repository for HLW and spent fuel; and

3. Co-located repositories for LLW which is not suitable for disposal at the LLWR plus ILW, HLW and spent fuel together.

In the first case for a repository for ILW and LLW which is not suitable for disposal at the LLWR, the siting costs are estimated to be £960M, comprised of the consultation process (£50M), and site selection with site characterisation (£910M).

If the facility is for HLW and SNF only the estimate for development is £920m and transport costs of £300m. For HLW and SNF repositories the R and D site screening and evaluation costs range between 10% to 80% of the total costs.

If the facility is for ILW/HLW/LLW/SNF the development costs have been estimated to be £1100m of which £1050m covers site characterisation and £50m covers consultation.

NIREX have spent £7000m on its deep disposal programme and this is regarded as a sunk cost.

In addition to the costs associated with the deep geological option there would need to be provision made for interim storage of waste until the repository became available. It is estimated that this would cost £1235m.

Timescales for the provision of a repository are likely to include development from 2005 – 2020 followed by design and initial construction up to 2040 with operations commencing in 2040 until 2090.

Costs of siting a centralised interim store

Costs for interim storage of waste vary depending on whether the interim stores are centralised or at current location. If stores are centralised there will be the requirement for 16 stores for the entire UK ILW inventory, one store for HLW, two stores for spent fuel, one store for plutonium, and five uranium stores.

For the purposes of this report the costs have been given only for the ILW from Magnox, BE AGR UKAEA and AWE sites as the other stores are common to both the interim storage options i.e. the centralised storage option and the storage at current location option.

15 Crawford M and Wickham S (2005) CoRWM Criteria Discussion Paper: Cost

If the interim store were above ground it is likely that the facilities would require additional security and protection against attacks. An estimate has been made that this may increase the costs of an unprotected above ground store by 30%. Data has been provided for protected stores only.

Application, consultation and planning costs for a central facility is likely to be application costs of around £5m, stakeholder consultation costs of around £50m, public relation costs of around £2m and public enquiry costs of around £12m. This would cost £69m in total.

Costs of research and development to support the selection of the specific location at each site including the safety case are predicted to be in the order of £50m.

Overall costs for the development of centralised interim stores would be in the order of £195m, including application, planning and consultation costs of £24m, research and development costs of £50m and regulation costs of £76m.

The total lifecycle cost (including development, design and construction, operation and decommissioning) for interim centralised protected stores would be in the region of £11,005 million. This cost is for the suite of stores that would be needed at a centralised location for all HLW and ILW and is a lifecycle costs for the projected 300 year lifetime.

Table B1: Centralised location costs for storage (excluding development and security costs).

Type of store	Location	Number of stores	Cost per store	Total cost
Large EPS for ILW	Sellafield	16	£321m	£5,136m plus £25m one off design costs
VPS for HLW Upgrade of existing store	Sellafield	1	£963m	£963m
VPS for SNF	Sellafield	2	£1137m	£2292m including a one off design cost of £18m
Large EPS for Pu	Sellafield	1	£321m	£321m plus £25m one off design costs
EPS for Uranium	Sellafield	5	£150m	£750m plus a one off design costs of £12m

Table B2: Cost summary for centralised stores option.

Type of cost	Cost (£m)
Development	195
Stores	9524
Transport	375
Infrastructure	110
Security	800

Timescales for a single interim above ground store are likely to be development from 2005 – 2025, design and construction from 2005 – 2045 with operation from 2005.

Costs of siting several regional storage facilities

To support CoRWM information was provided about the likely requirement for interim stores. The requirement ids stated to be 7 stores for ILW from Sellafield, Windscale and Calder Hall, 18 ILW stores at the BE AGR, Magnox and UKAEA sites, 1 store at Sellafield for HLW, 1 SNF store at Sellafield, 1 SNF store at Sizewell, I plutonium store at Sellafield, 4 uranium stores at Capenhurst and 1 uranium store at Sellafield. .

Centralised storage is considerable cheaper than storage at each licensed site saving around 33% to 50% of the costs. The key difference is the requirement for institutional control at multiple sites over the 300 years projected lifetime

Application, consultation and planning costs for each regional facility are likely to include application costs of around £3.5m, stakeholder consultation costs of around £2m, public relation costs of around £500k and public enquiry costs of around £2m. This would be equivalent to £8m per site.

Costs of research and development to support the selection of the specific location at each site including the safety case are predicted to be in the order of £4m per site

Overall costs for the development of all regional stores would be £950m of which application, consultation and planning would account for £152m, research and development £76m and regulation £722m.

The total lifecycle costs (including development, design and construction, operation and decommissioning) of sufficient regional interim protected ILW stores and sufficient centralised stores for other wastes (such as HLW, SNF, PCM and uranium) would be in the region of £17,195 million.

Table B3: At location costs for storage (excluding development and security costs).

Type of store	Location	Number of stores	Cost per store	Total cost
Large EPS for ILW	Sellafield	7	£321m	£2247m plus £25m one off design costs
Small EPS for ILW	At sites	18	£177.5m plus £10m design cost at each site	£3375m including design costs
VPS for HLW Upgrade of existing store	Sellafield	1	£963m	£963m
VPS for SNF	Sellafield and Sizewell	2	£1137m plus a design costs of £18m at each site	£2310m including design costs
Large EPS for Pu	Sellafield	1	£321m plus £25m design costs	£346m including design costs
EPS for Uranium	Capenhurst (4) and Sellafield (1)	5	£150m plus £12m design cost at each site	£774 including design costs

Table B4: Cost summary for at location stores option.

Type of cost	Cost (£m)
Development	950
Stores	10040
Security	6200

The total costs (including development, design and construction, operation and decommissioning) of sufficient regional interim protected stores would be in the region of £17,195 million. Timescales for developing regional stores are likely to be development from 2005–2040, design and construction from 2005–2125 with operation starting in 2005. The costs of the three approaches are summarised below.

Table B5: Comparison of costs for storage and disposal.

	Phased deep geological repository	**Protected storage at centralised location**	**Protected storage at 19 current locations**
Development costs			
Application		5	66.5
Stakeholder engagement		50	38
Public Relations		2	9.5
Planning Inquiry		12	38
R and D to support site selection		50	76
Regulation over lifetime		76	722
Total Development Costs	**960**	**195**	**950**
Transport	371	371	0
Lifecycle costs	**9500**[16] **or 13245**[17]	**11005**	**17195**

16 Assumes co-location of the ILW/HLW and Spent Fuel disposal.

17 Lifecycle costs for two separate facilities one for ILW and one for HLW/Spent fuel. Individual costs are £7,070m and £5,410m respectively.