

RWMD responses to Partnership request for clarifications from 22 May 2012

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1. Q. IAEA guidance and which bit is regulation **WCP Table item 3**

Answer

The UK is a contracting party to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (“the Joint Convention”) which entered into force on 18 June 2001. IAEA Safety Standards constitute a useful tool for contracting parties (and their operators and regulators) to assess their performance under the Joint Convention.

Thus none of the safety standards has the status of “regulation” (because regulation is a matter for individual states- the contracting parties), however they are used as benchmarks to assess regulatory and other arrangements. The degree of compliance that is expected is different for fundamentals, requirements and guidance. The UK complies with the fundamentals and requirements and uses the guidance to ensure that it’s specific requirement follow international good practice.

Status of IAEA safety standards

Under the terms of Article III of its Statute, the IAEA is authorised to establish or adopt standards of safety for protection of health and minimisation of danger to life and property, and to provide for the application of these standards. These standards must be used by the IAEA in its own operations, and can be applied by IAEA Member States as a reference for national regulations in respect of facilities and activities, and to underpin regulatory provisions for nuclear and radiation safety. Certain international conventions (such as the Joint Convention) contain requirements similar to those in IAEA safety standards and make them binding on contracting parties.

Regulating safety is a national responsibility, and many Member States have decided to adopt the IAEA’s standards for use in their national regulations. The principal users of safety standards in IAEA Member States are regulatory bodies and other relevant national authorities to enhance safety in nuclear power generation and in nuclear applications in medicine, industry, agriculture and research. IAEA safety standards are also used by many organisations that design, construct and operate nuclear facilities, as well as organisations involved in the use of radiation and radioactive sources.

IAEA safety standards reflect an international consensus on what constitutes a high level of safety for protecting people and the environment from harmful effects of ionising radiation. The process of developing, reviewing and establishing IAEA standards involves the IAEA Secretariat and all IAEA Member States.

They are issued in the IAEA Safety Standards Series, which has three categories:

Safety Fundamentals

Safety Fundamentals present the fundamental safety objective and principles of

protection and safety, and provide the basis for the safety requirements.

Safety Requirements

An integrated and consistent set of Safety Requirements establishes the requirements that must be met to ensure the protection of people and the environment, both now and in the future. The requirements are governed by the objective and principles of the Safety Fundamentals. If the requirements are not met, measures must be taken to reach or restore the required level of safety. The format and style of the requirements facilitate their use for the establishment, in a harmonized manner, of a national regulatory framework. Requirements, including numbered 'overarching' requirements, are expressed as 'shall' statements. Many requirements are not addressed to a specific party, the implication being that the appropriate parties are responsible for fulfilling them.

Safety Guides

Safety Guides provide recommendations and guidance on how to comply with the safety requirements, indicating an international consensus that it is necessary to take the measures recommended (or equivalent alternative measures). The Safety Guides present international good practices, and increasingly they reflect best practices, to help users striving to achieve high levels of safety. The recommendations provided in Safety Guides are expressed as 'should' statements.

Safety requirements for disposal of radioactive waste (in all types of facilities not just geological disposal facilities) were published in April 2011 (SSR-5). They are high level requirements applicable to all types of disposal facilities.

The IAEA has issued safety guidance on geological disposal since the 1980s. This guidance has been updated periodically and the most recent was published in 2011¹. The guidance is primarily concerned with activities associated with the development of geological disposal facilities after a site has been selected. Paragraph 1.10 states:

'... siting encompasses a range of activities from initial conceptual design and site selection through to confirmation of the site for construction of a disposal facility. Whilst site characterization and site confirmation are addressed in this Safety Guide, site selection is not because it includes many aspects that are non-technical and specific to the societal context.'

However, the scientific and technical aspects of siting are discussed in an appendix to the safety guidance. This recognises the importance of geological setting in site selection but is not prescriptive about the approach to be used.

'In site selection, one or more preferred candidate sites are selected after the investigation of a large region, the rejection of unsuitable sites and the screening and comparison of the remaining sites. From several, possibly many, prospective sites identified at the start of a siting process, a selection is made of one or more preferred sites on the basis of geological setting and with account taken of other factors. Sociopolitical factors are an important consideration in any site selection process (e.g. demographic conditions, transport infrastructure, existing land use). (I-1)

The guidance also recognises a role for voluntarism in siting

¹ Geological Disposal Facilities for Radioactive Waste, Specific Safety Guide, IAEA Safety Standards Series No. SSG-14, 2011

'Decision making in the site selection process may involve various levels of involvement of the public and local communities, including the use of veto and volunteerism. The national preferences expressed will vary from State to State and hence cannot be addressed within international guidance for the safety of geological disposal facilities.' (I-1)

Therefore a process involving voluntarism followed by consideration of geological and other important factors is consistent with international guidance.

International examples include NWMO in Canada who are using a system called 'Adaptive Phased Management'. http://www.nwmo.ca/home?language=en_CA

The guidance acknowledges that during the initial stages of site selection, geological information may be lacking.

During the initial stages of site selection, geological and hydrogeological site specific information may be sparse or lacking. Nevertheless, such data that are available and expert judgement should be used in support of a decision to select one or more locations as a prospective underground disposal site.

The appendix also gives general guidance on geological setting.

A promising site should display evidence of favourable natural containment and isolation characteristics for the waste types under consideration and should provide indications that all necessary engineered barriers to prevent or retard the movement of radionuclides from the disposal system to the accessible environment can be implemented. This evidence needs to be tested in subsequent detailed site investigation, characterization and associated safety assessment modelling. (I-1)

Later sections give more detail on geological setting.

The geological setting of a disposal facility should be amenable to overall characterization and should have favourable geometrical, physical and chemical characteristics for hosting the disposal facility and for inhibiting the movement of radionuclides from the disposal facility to the surface environment during the time periods of concern. (I-21)

There is a preference for geologically simple formations:

Uniform rock formations in comparatively simple geological settings are preferred because they are likely to be more easily characterized and their properties are likely to be more predictable. Similarly, formations with few major structural features or potential transport pathways whose impact on performance can be readily assessed are also preferred. (I-22)

Nevertheless, there is a recognition that complexity may be unavoidable.

'However, it is appreciated that as investigations and characterization proceed, seemingly simple environments might prove to be more complex than first expected.' (I-22)

The guidance also states that the host rock should also be robust with respect to future evolution

The host rock should not be liable to be affected by future geodynamic phenomena (e.g. climate change, neotectonics, seismicity, volcanism, diapirism) to such an extent that these could unacceptably impair the containment and isolation capabilities of the overall disposal system.(I-25)

With respect to hydrogeology, the guidance states

The hydrogeological characteristics and the setting of the geological environment should tend to restrict groundwater flow within the disposal facility and should support the safe containment and isolation of waste for the required time. The groundwater system should be well enough understood to provide confidence that any radionuclides that might migrate from the disposal facility environment would be retarded due to limited connectivity or would be dispersed in the geosphere, resulting in sufficiently long travel times that reduce their concentration at the surface. (I-28)'

2. Q. *Stage 4 & 5 schedule.* Outline a possible schedule for a CSP/s during Stage 4, so stakeholders now can see roughly what kind of work might be required, and therefore how they may wish to relate to it. At its simplest this Work Programme is possibly just a collation of the items in the right hand column here, against a provisional timeline. Schedule would need to include coverage of SEA/EIA, DSSC development, inventory, R&D, benefits, geological investigations etc. [Action RhauriB to coordinate, chapter leads to contribute inputs [WCP Table item 4](#)

Answer

We've some comments on Rhauri's note, which Elizabeth will discuss with you.

3. Q. *SEA.* Ask legal advisors (not Wragge as their experience of European legislation doesn't appear strong enough) what the risk is that an SEA hasn't been carried out on the MRWS process as a whole:

- **How is the "Managing Radioactive Waste Safely" process compatible with European environmental legislation?**
- How can consideration of alternative sites be applied under SEA in a voluntary site identification process?

[Action SteveS and GuyR] [WCP Table item 7](#)

Answer

There's a meeting with some Steering Group Members on 20 June to discuss this.

4. Q. *Transport.* Check how transport is covered already in Partnership documents, and how we can say more in the Final Report. If necessary, ask regulators to provide more information on high-level approaches to be taken on regulating transport of wastes to a repository (see Doc 36.1). Add transport to our opinion. [WCP Table item 14](#)

Answer

There has been an exchange of emails between John Harvey and Steve Smith on this. Latest words (which include John's comments) are;

"The transportation of radioactive materials is regulated under the Carriage of Dangerous Goods Regulations (2009) as amended (2011) which are reviewed and updated on a regular basis and reflect international agreements and European Directives. Dangerous goods are defined within the Regulations as being 'liquid or solid substances and articles containing them, that have been tested and assessed against internationally-agreed criteria - a process called classification - and found to be potentially dangerous (hazardous) when carried'. Dangerous goods are assigned to different Classes depending on their predominant hazard.

There are regulations to deal with the carriage of dangerous goods, the purpose of which is to protect everyone either directly involved (such as consignors or carriers), or who might become involved (such as members of the emergency services and public). Regulations place duties upon everyone involved in the carriage of dangerous goods, to ensure that they know what they have to do to minimise the risk of incidents and guarantee an effective response. Audits to check for compliance to the Regulations ~~is~~ are, for radioactive materials, carried out by ONR (?) who regulate, amongst others, the consignors (ie those responsible for sending the materials) to ensure their procedures for movement of the materials by either road or rail meet the requirements of the Regulations.”

5. Q. *R&D.* Expand our opinion on adequacy of R&D programme, flagging concerns raised and the limited response from NDA before PSE3. Add the presence of Issues Management process and that this goes some way to alleviating concerns. [Action RichardG to draft text] **WCP table item 15**

Answer

RWMD has published its R&D programme setting out priorities for work in the generic preparatory phase of their programme (NDA/RWMD/073). This includes indications for how important, urgent and how long the R&D will take. In addition, the recently developed issues management process provides a vehicle for regulators, CoRWM, waste producers and all stakeholders to raise any issues to RWMD about their work and see how such issues are being managed or are used to influence the RWMD work programme (NDA/RWMD/081). This process provides a formal route for engagement on particular subject areas, including mechanisms for taking contentious issues forward where there are differences in opinion of the work that is required among stakeholders or experts.

6. Q. Ask NDA to give early commitment to public education for both locals and visitors, including consideration of a visitor's centre that explains the work (in the context of voluntarism and the RoW still remaining). **WCP table item 17**

Answer

As outlined in the RWMD Strategy for public and stakeholder engagement and communications, RWMD is committed to working in partnership with communities who participate in the MRWS process. The Strategy recognises the need for local community capacity building and an information programme to help people to increase their knowledge about geological disposal and participate in the discussions. If a decision to participate is made RWMD will work with the community to establish what it should provide in terms of public education for both locals and visitors. This will include consideration of a visitors' centre to explain the programme in the context of voluntarism and the continued Right of Withdrawal.

7.Q. *Overseas Waste, Military Waste, and Scottish Waste.* Ask DECC to confirm their position on:

1. Accepting overseas waste including the policy of substitution, and also how and whether this position might change in future
2. How have they addressed para 26 of CoRWM's report which states that new build wastes are ethically and technically different and require a different process?
3. Whether military waste is included within the baseline and upper inventories, what form this is in and where it comes from
4. Disposal of Scottish waste in a GDF, including overseas waste that is currently in Scotland, and the implications of Scottish independence **WCP table item 21**

Answer

DECC will provide a response to all of this.

8.Q. *R&D on different options.* Ask NDA/DECC to provide an update on how they are responding to CoRWM's recommendation 5 (continuing R&D on alternative options for managing waste streams). **WCP table item 22**

Answer

Draft Response to Partnership on Alternative options

Whilst Government policy is to pursue the geological disposal of higher activity radioactive waste, in the Managing Radioactive Waste Safely White Paper, Government recognised the need to take account of developments in storage and disposal options, as well as possible new technologies and solutions [Para 4.32, 1]. This reflects Government's response to CoRWM recommendation 5 [2].

The Nuclear Decommissioning Authority (NDA) develop strategy for integrated and optimised management of waste across the NDA estate [3]. The need to develop radioactive waste storage and disposal options and to investigate new technologies and solutions in waste management forms a key part of this strategy.

The NDA has established the Radioactive Waste Management Directorate (RWMD) to manage the delivery of geological disposal for higher activity radioactive wastes. Keeping alternative long-term waste management options to geological disposal (options such as long-term storage, deep borehole disposal and technologies e.g. partitioning and transmutation) under review is one of the 16 strategic activities set out in our Technical Strategy [4] that we use to develop the technical programme.

The findings from RWMD's reviews of options will be published periodically and these publications will provide the basis for communicating developments in radioactive waste management options with Government and stakeholders. (We plan to publish our first review by September 2012.) If an alternative disposal option is identified as sufficiently developed that the option potentially requires consideration relative to geological disposal, then RWMD will provide this information to Government. It will then be the responsibility of Government to make such a decision and change relevant policy, if necessary.

Developments in radioactive waste disposal and storage options and proven new solutions and technologies may also have impacts on the concepts for geological disposal being considered by RWMD. Such developments and any proposed associated changes to the geological disposal concepts will be managed through RWMD's concept change management procedure where the nuclear safety and environmental significance of any proposed changes would be taken into account. To date, the findings of these reviews have been that none of the options addressed alters the fundamental requirement for a GDF, but they could potentially (in some form) be incorporated into an optimised strategy for management of the back-end of the nuclear fuel cycle (and other arisings of radioactive waste).

[1] MRWS White Paper

[2] CoRWM recommendations, November 2006.

[3] NDA, Integrated Waste Management Strategy Development Programme-Final, Doc ref SMS/TS/D-IWM/002, May 2012.

[4] Technical Strategy

9.Q. *Inventory Principles.* **Review principles [Action RichardG]** **WCP table item 23**

Answer

Elizabeth has spoken with Richard- nothing required from RWMD.

10.Q. Final Report response: Include a description of where/how people can access all the information associated with the Nirex Planning Inquiry, and associated investigations (provided by NDA). **WCP 1v**

Answer

Sent to Rhuari 15/5/12

11.Q. Final Report response: **Review Figure 11 on p41 with regulators and RWMD and decide if more clarity can be given. Could result in developing new diagram/s or perhaps two – contact Simon Morgan at RWMD regarding their revised diagrammatic representation of the permissioning schedule in order to ensure consistency.** **WCP 2p**

Answer

Note referred to in answer 2 may help with this.

12.Q. PSE3 response: The NDA says: “The Radioactive Waste Management Directorate (RWMD) of the NDA is responsible for the programme that delivers the geological disposal facility. In due course its ownership may be opened up to competition in line with other NDA sites. Further dialogue with Government, the regulators and the supply chain will be required before the step is taken to determine whether this is the appropriate implementation approach.” **[This is text taken from current website – check with NDA for any updates.]** **WCP 6**

Answer

No current update, the statement is up to date.

13.Q. Final Report response: Consider adding 2 things to this chapter:

1. **Annual permissions for rock extraction across Cumbria (or West Cumbria?) to allow a comparison with the spoil amounts. (Action StewartK)**
2. The issues regarding spoil that would need to be addressed if the siting process occurs would include:
 - a. What is the maximum amount on-site at the peak?
 - b. What value and usage does it have: resale or backfill?
 - c. What is the transport impact of moving it off-site? And to where?
 - d. What are the environmental impacts of storing it on-site? **WCP 3h**

Answer

Response sent to Mike Heaslip and copied to Rhuari who's confirmed that no more is needed.

3j Q. Our consultation document (p57) provides a schedule of impacts that we suggest should be considered at a later date if the process goes ahead, and more detail can be found in Document 163 Appendix A. The list on p57 explicitly covers the impact on human health, which would need to include an assessment of the risk

and consequence of escape of radiation from a potential facility at some point in the future.

Answer

Suggested additional words added below

Our consultation document (p57) provides a schedule of impacts that we suggest should be considered at a later date if the process goes ahead, and more detail can be found in Document 163 Appendix A. The list on p57 explicitly covers the impact on human health, which would need to include an assessment of the risk and consequence of escape of radiation from a potential facility at some point in the future. **During MRWS Stage 4 NDA would undertake a Health Impact Assessment that will evaluate the effects a facility could have on a community' health and well being.**

14.Q. PSE3 Response: We agree that the process of investigating geological suitability and potentially constructing a facility can affect the geology. The NDA incorporate these considerations into the site investigation process and it is part of the judgement about geological suitability. **(fact-check with NDA) WCP 3k**

Answer

The drilling of boreholes into the potential host rock has the potential to provide migration pathways for radioactive material back to surface from the facility if they are not sealed in an appropriate manner. The Framework document indicates that one of the sub-criteria which will be considered under Geological Setting is “the level of difficulty to ultimately characterise the Potential Candidate Site”. A number of factors will be considered in the assessment of this sub-criterion including the ease of sealing investigation boreholes in a manner consistent with the safety case.

Another sub-criterion under Geological Setting is “The level of technical challenges from construction and engineering conditions and the availability of knowledge and technology by which they can be overcome”. This assessment of the technical challenge will include consideration of the impact that potential engineering solutions have on the particular host rock at each Potential Candidate Site taking into account factors such as the likely excavation damage zones and challenges related to closing the facility.

15.Q. PSE3 Response: We agree. This has been incorporated into our thinking from the start of the process, and would need to be acknowledged by the DMBs if the siting process starts. **WCP 3I**

Answer

PSE3 Response: We agree. This has been incorporated into our thinking from the start of the process, and would need to be acknowledged by the DMBs if the siting process starts.

The strategic Environmental Assessment (SEA) that NDA would conduct in MRWS Stage 4 would assess these impacts.

16.Q. PSE3 Response: We agree the scale of impacts is unclear. This is because at this early stage in the process, it is impossible to define what the impacts would be: there is no site, so specifics cannot be assessed. Our consultation document lists the impacts that have been identified (p57) and sets them out in a schedule that shows how they would be assessed, and by whom (Document 163). If the siting

process starts, each impact would be assessed in much more detail and made publicly available. **WCP 3q**

Final Report response: Add underlined text to our opinion on p60: "...an acceptable process can be put in place during the next stage of the MRWS process to assess and mitigate any negative impacts. We acknowledge however that a huge amount of work regarding identifying and quantifying impacts will be required in future possible stages, and that this will need to be carefully examined by a CSP.

Answer

Suggested additional words below

PSE3 Response: We agree the scale of impacts is unclear. This is because at this early stage in the process, it is impossible to define the scale of the impacts: there is no site, so specifics cannot be assessed. Our consultation document lists the impacts that have been identified (p57) and sets them out in a schedule that shows how they would be assessed, and by whom (Document 163). If the siting process starts, each impact would be assessed in much more detail and this would be made publicly available. **The strategic Environmental Assessment (SEA) that NDA would conduct in MRWS Stage 4 would assess the impacts and identify appropriate mitigations.**

17.Q. PSE3 Response: Although these potential linkages exist, we believe it is too early in the process to consider the specifics of any connections. This would need to be done in detail if the siting process starts and potentially suitable sites are identified.

Final Report response: No change. **WCP 3u**

Answer

Suggested additional words below

PSE3 Response: Although these potential linkages exist, we believe it is too early in the process to consider the specifics of any connections. This would need to be done in detail if the siting process starts and potentially suitable sites are identified. **The strategic Environmental Assessment (SEA) that NDA would conduct in MRWS Stage 4 would assess these impacts.**

18.Q. PSE3 Response: This analysis must be done, but it is only possible if and when potential sites start to be identified. We therefore expect this to be carried out by a future CSP, if the process progresses to Stage 4. **WCP page 28**

Answer

Suggested additional words below

PSE3 Response: This analysis must be done, but it is only possible if and when potential sites start to be identified. We therefore expect this to be carried out by a future CSP, if the

process progresses to Stage 4. **The strategic Environmental Assessment (SEA) that NDA would conduct in MRWS Stage 4 would assess these impacts.**

19.Q. Final Report response: Add to p56 as an additional sentence on last paragraph “We recognise that some impacts will be focussed on very local communities, whilst other impacts may affect people further away. Both must be considered and addressed by the siting process if it moves forward”. **WCP page 29**

Answer

Suggested additional words below

Final Report response: Add to p56 as an additional sentence on last paragraph “We recognise that some impacts will be focussed on very local communities, whilst other impacts may affect people further away. Both must be considered and addressed by the siting process if it moves forward”. **The strategic Environmental Assessment (SEA) that NDA would conduct in MRWS Stage 4 would assess these impacts.**

20.Q. PSE3 Response: Impacts on rights of way are important but can only be considered in the light of specific site proposals. We expect them to be addressed fully if a specific proposal ever comes to a planning application. **WCP page 30**

Answer

Suggested additional words below

Impacts on public rights of way have not been considered. [A]

PSE3 Response: Impacts on rights of way are important but can only be considered in the light of specific site proposals. We expect them to be addressed fully if a specific proposal ever comes to a planning application. **The strategic Environmental Assessment (SEA) that NDA would conduct in MRWS Stage 4 would assess these impacts.**

21.Q. PSE3 Response: We acknowledge that this perception exists in some parts of the community, and we were explicit about this in our consultation document (p68). However, we believe that a community benefits package *could* be a reasonable opportunity for a local community hosting a national facility, assuming firstly that safety and site suitability can be proven, and secondly that a package is negotiated transparently and fairly. The principles in the consultation document (p69) aim to make transparent the way in which we believe a package could be negotiated to avoid it being seen as a bribe. A bribe would be corrupt, covert and illegal, whilst a community benefits package seeks future investment for an affected area to ensure that its economy and environment is protected for the future. We see a significant difference between the two. **WCP 4a**

Answer

Revised wording suggested below

4a. Community benefits are a bribe. [B]

PSE3 Response: We acknowledge that this perception exists in some parts of the community, and we were explicit about this in our consultation document (p68). However, we believe that a community benefits package could be a reasonable opportunity for a local community hosting a national facility, assuming firstly that safety and site suitability can be

proven, and secondly that a package is negotiated transparently and fairly. The principles in the consultation document (p69) aim to make transparent the way in which we believe a package could be negotiated to avoid it being seen as a bribe. A bribe would be corrupt, covert and illegal, whilst a community benefits package ~~seeks future investment for an affected area to ensure that its economy and environment is protected for the future.~~ recognises that the host community would have decided to fulfil an essential service for the nation. We see a significant difference between the two.

22.Q. How would we communicate with future inhabitants about what a GDF is? [B]

Check with NDA and/or DECC on the situation regarding current thinking. Does MoDeRN cover this as a topic? Add to PSE3 response and Final Report as appropriate. WCP5i

Answer

MoDeRN doesn't specifically tackle what information we can leave behind for future inhabitants. NDA recognises that to support the capability of future society to make informed decisions, we need to maintain access to knowledge and information. This is recognised as a key objective for long-term radioactive waste management. A wide range of options have been looked at internationally. These range from developing etching materials that don't corrode (Japan), markers for the surface (USA) or preserving the memory of the facility. The methods chosen will be the result of collaboration between Government, stakeholders, the implementer and the community and can be changed or updated to meet changing needs over time.

This is what Geological disposal: Environmental safety case main report, NDA Report No. NDA/RWMD/021, 2010) has;

4.1.6 Active and passive institutional controls

Institutional controls can be active or passive. Active controls are those by an authority or institution permitted under EPR 2010 [2], involving monitoring, surveillance and remedial work at a GDF site, as necessary, as well as control of land use. Passive controls are those that, once taken, do not require any further involvement of the authority or institution under EPR 2010; they apply mainly to the period after the environmental permit is surrendered. Examples of passive controls include retention of information about the site as part of government archives and maps, or in records centres or libraries, government ownership or control of land, and establishment of durable site marker systems (e.g. [1]).

For this generic ESC, this section is relatively brief, and is mainly here as a placeholder for future updates of the ESC.

During the pre-operational and operational periods of a GDF, the institutional controls would be the same as those adopted for any other nuclear facility in the UK. Prior to the operational period, a GDF would become a nuclear licensed site which, in conjunction with the environmental permit, would establish the requirement for operational institutional controls. Any claim for active institutional control would be supported by detailed forward planning of organisational arrangements and a suitable demonstration of funding arrangements. In this regard, we note that funding for the development of a GDF for the disposal of legacy wastes would come from the UK Government through the NDA.^[1]

^[1] The mechanism for funding disposal of higher activity radioactive wastes arising from the proposed programme of new nuclear power plant development in the UK is still to be defined. However, we expect that the cost of such disposal would be funded by the plant operators.

What happens to the site following closure would be a matter for future generations – the site could be farmed, forested, allowed to return to nature, or used for construction or other purposes. The waste would remain isolated within the multi-barrier system in the geological formations hundreds of metres below the ground surface. We would provide records of the location and general contents of the facility to local records offices and the National Nuclear Archive.

The site could also be retained under active control for some period of post-closure monitoring if desired by future generations living in or near the host community. However, the ESC makes no reliance on any post-closure period of active institutional control.

23.Q. The ability to monitor is essential from a safety point of view. [B]

PSE3 response: We agree. We highlighted the issue of monitoring in our consultation document (p76). We note that a research project has been launched at a European level and will advise the DMBs to keep abreast of developments if they enter Stage 4 of the MRWS process. We would expect Stage 4, if it happens, to address this issue to allay concerns.

Final Report response: Add details of MoDeRN project to last para on p76, based on Document 203 (briefing note on MoDeRN). Add recommendation to work with NDA to understand what monitoring options exist and what their implications are. **WCP 3 (page 41)**

Answer

The MoDeRN project is currently preparing a framework for approaching monitoring. This will cover objectives; techniques for monitoring; and analysis of monitoring results, including case studies for how that framework would be applied. It also addresses state-of-the-art technology to support monitoring programmes; the major part of this work is in considering techniques (particularly non-intrusive techniques) for monitoring disposal cells – this focuses on providing information during the early stages after waste is emplaced. The case studies and examples provide a basis for taking monitoring forward but any monitoring programme will need to be tailored to the specific disposal solution applied and to the wastes and barriers to be monitored. In all cases and in line with the Environment Agency regulatory advice (in the GRA) any monitoring provision must not compromise the safety of disposal.

24.Q. Spent fuel, plutonium and uranium have safety implications or could be useful in the future so should not be included. [B]

PSE3 response: These three issues are being dealt with by separate Government processes, and are therefore for Government to decide rather than this process. We have developed our Inventory Principles (p81) to provide a basis for the change process for the inventory, and because of the fact that several specifics cannot be known at this point. We do note however that the 2010 baseline inventory and also the upper inventory (see p84) do make provision for these materials to be disposed of in a repository.

Final Report response: Add to Box 27 to explain the differences between baseline and upper inventory figures for spent fuel, plutonium and uranium **[ask NDA/DECC for suggested text]**. **WCP 6e**

Answer

See response to item 7 on Baseline and Upper Inventory

25.Q. The upper inventory should be assumed. AND 6o. A GDF should accept all and any waste types, including potentially all new build waste and overseas waste, for a financial gain. [B/potential C for 6o]

PSE3 response: We believe this is not for the Partnership to take a view on, but for the DMBs to negotiate with Government should West Cumbria enter the siting process. *[NB this will need amending if the Partnership decides to take a view on specific waste streams in its revised opinion.]*

Final Report response: Add to new paragraph after inventory principles (currently p82) to include: "The current assumption is that the inventory would be signed off by DMBs at the end of stage 5 alongside agreement with any future Partnership. Should the process move as far as stage 6, we would expect a process for community veto on inventory changes to have been agreed. **WCP 6n**

Answer

Is anything required to help with this?

26.Q. The upper inventory is significantly bigger than the lower – this heightens feelings of uncertainty. [B]

PSE3 response: We know that uncertainty is a big issue in relation to the inventory. However, the principles we have agreed with Government (p81) allow for progressively clearer agreements to be developed around the inventory as the siting process advances. Principle 2 outlines the process and timing for agreeing how the DMBs can have a veto over future inventory changes, before any final decision is made about hosting a repository. We do also note though, that Government says that even at this point, there will be some uncertainty about the waste that will require geological disposal, but we expect it to be significantly less than it is now. If the CSP and DMBs are not satisfied at this point and negotiations cannot resolve it, we would expect the RoW to be exercised.

Final Report response: Add diagram (based on Fred Barker's slide used in Partnership meeting) that illustrates what would be agreed at each stage, to handle the progressive reduction of uncertainty. Add text with clarifications relating to the above **WCP 6r**

Answer

Is any more than the response to Table item 21 needed?

27.Q. More research into reprocessing and recycling waste should happen before a GDF / reprocess as much as possible so only true waste is disposed of. [B]

PSE3 response: We understand that the nuclear industry currently works to apply the waste hierarchy, which means taking steps to avoid or minimise waste production and only disposing of what it has to. There are already R&D projects underway and planned to tackle this *[Action: fact check with NDA, and can we provide some specific examples?]*

Final Report response: Add text in expanded box 26 reflecting the above. **WCP 4 (page 48)**

Answer

NDA published an Integrated Waste Management Strategy Development Programme in May 2012^[i], which includes the high level programme to enable better application of the waste hierarchy including more characterisation, sorting, segregating, re-use and recycling. This also identifies how the developing strategy for higher activity wastes seeks to optimise the management of higher activity wastes, including the use of alternative (to GDF) disposal options, such that disposal to the GDF is optimised.

Application of the waste hierarchy is a fundamental principle of NDA Strategy and is embodied within UK regulation. NDA published an Integrated Waste Management Strategy Development Programme in May 2012ⁱ, which includes the high level programme to enable better application of the waste hierarchy including more characterisation, sorting, segregating, re-use and recycling. This also identifies how the developing strategy for higher activity wastes seeks to optimise the management of higher activity wastes, including the use of alternative (to GDF) disposal options, such that disposal to the GDF is optimised.

This document notes the good work already undertaken, and which continues, for LLW management. "There has been more application of the waste hierarchy and waste producers are working together and with the supply chain to deliver more optimised waste management. This change was driven by the UK Nuclear Industry LLW Strategy published in 2010". Following on from publication of the UK Nuclear Industry LLW Strategy, the NDA strategy development programme will now focus more on Higher Activity Waste management.

The products identified under the product area of "overarching integrated waste management issues" focus on appropriate disposal routes for all wastes. The tasks in this product will investigate and realise the opportunities for a more integrated approach to waste management in the NDA estate. For example, product H3 will involve the identification of opportunities for alternative management of waste close to waste class boundaries and establishment of criteria to support decision making (in particular how to assess wastes that could be consigned either to the GDF or LLWR).

To support the development of strategic and/or tactical guidance, RWMD has identified a number of specific tasks that will support the NDA Strategy development and will support waste producers to better apply the waste hierarchy. These tasks are listed below and will be delivered as part of a three year work programme that started in March 2012.

- Decay store short-lived ILW to allow disposal to near surface facilities
- Review packaged waste against current LLW acceptance criteria
- Optimise characterisation activities across the NDA estate
- Waste management by safety case argument
- New routes for tritiated desiccants (i.e. not to a GDF)
- Benefits and disbenefits of LLW/ILW disposal routes (enabler)
- Segregation of LLW
- Optimise management of metals (decontamination and/or smelting)

Other studies will be delivered through the NDA direct research portfolio, building on studies that have been commissioned by NDA in recent years, and building on the work being done across all waste producers for specific wastes.

^[i]. Trauth, K.M., Guzowski, R.V., Chris, Z., Pflug, G. and Rodriguez, R.J., Effectiveness of Passive Institutional Controls in Reducing Inadvertent Human Intrusion into the Waste Isolation Pilot Plant for Use in Performance Assessments. In: Title 40 CFR

Part 191 Compliance Certification Application for the Waste Isolation Pilot Plant. Appendix EPIC. WIPP/CAO-96-3 168, US Department of Energy, Carlsbad, NM, June 1996.

ⁱ <http://www.nda.gov.uk/news/iwm-strategy-development-programme.cfm>

28.Q. The Partnership should have sought more information on encapsulation and fuel mixing. [B]

PSE3 response: We agree that there is not much information available currently on these issues, although we did highlight in our consultation document that other facilities such as a spent fuel encapsulation plant could be sited near or at the surface facility. We acknowledge that any additional facilities such as these would have implications on the scale of the land required and the associated impacts of construction and operation. However, there is no Government policy on this yet, and we understand there will not be in the foreseeable future. We will therefore advise the DMBs that if they enter Stage 4 of the process, they investigate with Government the implications and policy process for such plant.

Final Report response: Page 15 – not much detail on this currently. Add to advice in design and engineering chapter “CSP/DMBs should investigate the likely additional plant that would be developed near or at the surface facility, so that the full design impacts and implications can be assessed”. **WCP 11**

Answer

If required, we can provide more information on the potential for “enhancing” the GDF project by including facilities such as encapsulation plant. However this isn’t really an issue for now and the proposed addition probably says as much as is needed.

29.Q. CoRWM supported geological disposal as part of a mixed programme. [D]

PSE3 response: We are aware of CoRWM’s recommendations in 2006, in particular recommendation 5, that R&D should continue to search for other better ways of managing the different radioactive waste streams. We will ask the NDA for an update on this research and recommend that any future CSP continue to hold a watching brief on developments.

Final Report response: **See action 22 in the table above.** Add in advice that a CSP/DMBs should maintain a watching brief on R&D on alternative management options for different waste streams within the inventory. **WCP 13**

Answer

To support the development of strategic and/or tactical guidance, RWMD has identified a number of specific tasks that will support the NDA Strategy development and will support waste producers to better apply the waste hierarchy. Other studies will be delivered through the NDA direct research portfolio, building on studies that have been commissioned by NDA in recent years, and building on the work being done across all waste producers for specific wastes.

Alternative options

Whilst Government policy is to pursue the geological disposal of higher activity radioactive waste, in the Managing Radioactive Waste Safely White Paper, Government recognised the need to take account of developments in storage and disposal options, as well as possible new technologies and solutions [Para 4.32, 1]. This responds to CoRWM recommendation 5 [2].

The Nuclear Decommissioning Authority (NDA) develop strategy for integrated and optimised management of waste across the NDA estate [3]. The need to develop radioactive waste storage and disposal options and to investigate new technologies and solutions in waste management forms a key part of this strategy.

The NDA has established the Radioactive Waste Management Directorate (RWMD) to manage the delivery of geological disposal for higher activity radioactive wastes, as required under UK Government policy [1]. Keeping alternative long-term waste management options to geological disposal (options such as long-term storage, deep borehole disposal and technologies e.g. partitioning and transmutation) under review is one of the 16 strategic activities set out in our Technical Strategy [4] that we use to develop the technical programme.

The findings from RWMD's reviews of options will be published periodically and these publications will provide the basis for communicating developments in radioactive waste management options with Government and stakeholders. (We plan to publish our first review by September 2012.) If an alternative disposal option is identified as sufficiently developed that the option potentially requires consideration relative to geological disposal, then RWMD will provide this information to Government. It will then be the responsibility of Government to make such a decision and change relevant policy, if necessary.

Developments in radioactive waste disposal and storage options and proven new solutions and technologies may also have impacts on the concepts for geological disposal being considered by RWMD. Such developments and any proposed associated changes to the geological disposal concepts will be managed through RWMD's concept change management procedure where the nuclear safety and environmental significance of any proposed changes would be taken into account. To date, the findings of these reviews have been that none of the options addressed alters the fundamental requirement for a GDF, but they could potentially (in some form) be incorporated into an optimised strategy for management of the back-end of the nuclear fuel cycle (and other arisings of radioactive waste).

[1] MRWS White Paper

[2] CoRWM recommendations, November 2006.

[3] NDA, *Integrated Waste Management Strategy Development Programme-Final*, Doc ref SMS/TS/D-IWM/002, May 2012.

[4] Technical Strategy

30.Q. Has the option of a “world repository” been considered?

PSE3 Response: Yes a world repository has been considered before. For details of Pangea at http://en.wikipedia.org/wiki/Pangea_Resources WCP page 56.

Answer

Although Australia does not have any nuclear power reactors, Pangea Resources considered siting an international repository in the outback of South Australia or Western Australia in 1998, but this stimulated legislative opposition in both states and the Australian national Senate during the following year.[94] Thereafter, Pangea ceased operations in Australia but reemerged as Pangea International Association, and in 2002 evolved into the Association for Regional and International Underground Storage with support from Belgium, Bulgaria, Hungary, Japan and Switzerland.[95] A general concept for an international repository has been advanced by one of the principals in all three ventures.[96] Russia has expressed interest in serving as a repository for other countries, but does not envision sponsorship or control by an international body or group of other countries. South Africa, Argentina and western China have also been mentioned as possible locations.[21][97] In the EU, COVRA is negotiating a European-wide waste disposal system with single disposal sites that can be used by several EU-countries. This EU-wide storage possibility is being researched under the SAPIERR-2 program.[98] also see - <http://world-nuclear.org/info/inf21.html>

It's worth noting that the recent EU Directive states that nations are responsible for their own wastes and puts an emphasis on "national" disposal facilities.