

ANNEX B: Radioactive Waste Management

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B.1 Introduction

B.1.1 The Nuclear White Paper stated that "before development consents for new nuclear power stations are granted, the Government will need to be satisfied that effective arrangements exist or will exist to manage and dispose of the waste they will produce"

20. The Government has considered this issue and this Annex sets out the Government's conclusions.

B.1.2 This Annex considers in particular "higher activity waste". On the presumption of a once through fuel cycle for new nuclear power stations (and therefore assuming no reprocessing of spent fuel), higher activity waste will comprise of spent fuel and intermediate level waste (ILW).

B.1.3 Geological disposal is the way in which higher activity waste will be managed in the long term. This will be preceded by safe and secure interim storage until a geological disposal facility can receive waste. A framework to implement this policy was set out in the Managing Radioactive Waste Safely (MRWS) White Paper published in June 2008

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B.1.4 New nuclear power stations will also produce other waste streams: low level waste, liquid and gaseous discharges, and non-radioactive wastes. The Government considers that arrangements already exist for the effective management and disposal of wastes in these categories, as demonstrated by the experience of dealing with such wastes from existing nuclear power stations.

B.1.5 The UK has robust legislative and regulatory systems in place for the transport of radioactive wastes, including higher activity waste. Transport of radioactive wastes is, and will continue to be, required to meet a number of national and international requirements to ensure the safety and security of such materials.

B.1.6 In reaching its view on the management and disposal of waste from new nuclear power stations, the Government has had particular regard to:

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Meeting the Energy Challenge: A White Paper on Nuclear Power, January 2008, CM 7296, URN 08/525, <http://www.berr.gov.uk/files/file43006.pdf>, p9

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MRWS White Paper, [http://mrws.decc.gov.uk/Annexes to the National Policy Statement for Nuclear Power Generation \(EN-6\)](http://mrws.decc.gov.uk/Annexes%20to%20the%20National%20Policy%20Statement%20for%20Nuclear%20Power%20Generation%20(EN-6)) 14

- whether geological disposal of higher activity waste, including waste from new nuclear power stations, is technically achievable;
 - whether a suitable site can be identified for the geological disposal of higher activity waste; and
 - whether safe, secure and environmentally acceptable interim storage arrangements will be available until a geological disposal facility can accept the higher activity waste.
- B.1.7 Each of these issues is addressed in turn in this Annex.

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B.2 Whether geological disposal is technically achievable

B.2.1 The Government accepts the Committee on Radioactive Waste Management's (CoRWM

22) 2006 recommendation on legacy wastes²³ that "within the present state of knowledge, geological disposal is the best available approach for the long-term management of all the material categorised as waste in the CoRWM inventory when compared with the risks associated with other methods of management. The aim should be to progress to disposal as soon as practicable, consistent with developing and maintaining public and stakeholder confidence" ²⁴.

B.2.2 Given international experience and the UK's own research, the Government is confident that a geological disposal facility could be built which would meet regulatory approval. The British Geological Survey reported in 2006 that "over 30% of the UK has suitable geology for siting a deep geological disposal facility"

²⁵ and CoRWM found that "there is high confidence in the scientific community that there are areas of the UK where the geology and hydrogeology at 200 metres or more below ground will be stable for a million years and more into the future" ²⁶.

B.2.3 The Nuclear Decommissioning Authority's (NDA) delivery organisation will meet all relevant regulatory requirements in its delivery of the geological

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CoRWM's primary task is to provide independent scrutiny on the Government's and NDA's proposals, plans and programmes to deliver geological disposal, together with robust interim storage, as the long term management option for the UK's higher activity wastes: www.corwm.org.uk/

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"Legacy wastes" is a common term used to describe radioactive waste which already exists or whose arising is committed in future by the operation of an existing nuclear power station.

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CoRWM Report: Recommendations to Government, July 2006, p111, available at http://www.corwm.org.uk/Pages/Lnk_pages/key_issues.aspx#recommendations

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UK Nirex Ltd and British Geological Survey, A note by the British Geological Survey and Nirex on the Suitability of UK Geology for Siting a Repository for Radioactive Waste, document 1797, March 2006.

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CoRWM Report: Recommendations to Government, July 2006, page 106. Annexes to the National Policy Statement for Nuclear Power Generation (EN-6) 15

disposal facility

27,28. There are a number of geological disposal concepts, based on the use of multiple containment barriers, that have been shown to be capable of meeting high standards of safety and security²⁹. The technology to implement these disposal concepts, such as engineered barriers and materials, is already available³⁰, and although no spent fuel geological disposal facility is currently in operation, programmes in Finland and Sweden are advanced, to the stage of extensive underground investigations. These programmes are on course to have such a facility operational by about 2020.

B.2.4 The Government considers, based on scientific consensus and international experience, that despite some differences in characteristics, waste and spent fuel from new nuclear build would not raise such different technical issues compared with nuclear waste from legacy programmes as to require a different technical solution. The disposability assessments that have been conducted by the NDA as part of the Generic Design Assessment (GDA) process support this view. The assessments have concluded that, compared with legacy wastes and existing spent fuel, no new issues arise that challenge the fundamental disposability of the wastes and spent fuel expected to arise from operation of the reactor designs currently being assessed by the GDA process (EPR and AP-1000). This conclusion is supported by the similarity of the wastes to those expected to arise from the existing pressurised water reactor at Sizewell B. The NDA has concluded that given a disposal site with suitable characteristics, the wastes and spent fuel from the EPR and AP-1000 are expected to be disposable.

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The NDA was established to deliver the Government's commitment to deal with the nuclear legacy. It is the body responsible for implementing the Geological Disposal Facility (GDF).

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MRWS White Paper, p38, <http://mrws.decc.gov.uk/>

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The OECD Nuclear Energy Agency, taking inputs from policy-makers, regulators and waste management organisations, has published a statement that geological disposal provides an acceptable and technologically feasible method for the long-term management of long-lived high-activity wastes such as spent fuel:
www.nea.fr/html/rwm/reports/2008/nea6433-statement.pdf

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Posiva Oy (Finland) Environmental Impact Assessment Report: Expansion of the Repository for Spent Fuel, 2008:
www.posiva.fi/en/nuclear_waste_management/required_permissions_and_procedures/environmental_impact_assessment_procedure

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Summary Disposability Assessment for the AP-1000:
<http://www.nda.gov.uk/documents/upload/TN-17548-Generic-Design-Assessment-Summary-of-DA-for-Wastes-and-SF-arising-from-Operation-of-APPWR-October-2009.pdf>.

Summary Disposability Assessment for the EPR:
<http://www.nda.gov.uk/documents/upload/TN-17548-Generic-Design-Assessment-Summary-of-Disposability-Assessment-for-Wastes-and-Spent-Fuel-arising-from-Operation-of-the-EPWR.pdf>. Annexes to the National Policy Statement for Nuclear Power Generation (EN-6)

16 B.3 Whether a suitable site can be identified

B.3.1 The MRWS White Paper sets out the framework for the implementation of geological disposal, including a flexible site selection process based on voluntarism and partnership. Experience around the world in developing geological disposal facilities demonstrates that this approach is likely to be the most successful way to develop a safe, secure, and environmentally acceptable facility that secures public confidence, which is why the Government has adopted this approach.

B.3.2 The MRWS process for implementing geological disposal is flexible and able to incorporate both robust technical site investigations and ongoing interactions between the project and the potential host community. The Government has therefore not set a fixed delivery timetable, but in planning the implementation of the national policy of geological disposal, the NDA has assessed that a UK facility could be operational for the disposal of legacy ILW by about 2040

32, with legacy High Level Waste/spent fuel emplacement beginning around 2075. Disposal of legacy waste is estimated to be completed by around 2130. It is currently anticipated that disposal of new build wastes would begin once disposal of legacy wastes is completed (though it might be possible to dispose of new build ILW somewhat earlier).

B.3.3 The Government favours a single geological disposal facility for all higher activity wastes if that proves technically possible. However it has not ruled out the alternative of there being more than one facility, and the MRWS site selection process is designed to be sufficiently flexible to accommodate this.

B.3.4 The MRWS White Paper sets out a step-by-step site selection process. Formal "expressions of interest" by communities about potential involvement, which is the first step in the process, have already been received
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B.3.5 The Government is committed to making the voluntarist and partnership approach to site selection work through the MRWS process. However, the Government recognises that it has a responsibility to deal with long-term higher activity waste management, is committed to geological disposal as the technical solution, such that it will seek to develop alternative ways to

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"Geological Disposal: Steps towards implementation":
<http://www.nda.gov.uk/documents/upload/Geological-Disposal-Steps-Towards-Implementation-March-2010.pdf>

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www.copelandbc.gov.uk/PDF/08-PR-%20jun-25%20expression-%20of-%20interest.pdf
www.allerdale.gov.uk/council-and-democracy/council-news/news-releases.aspx?prid=1020 www.cumbriacc.gov.uk/news/2008/december/09_12_2008-121129.asp?Layout=PrintAnnexes to the National Policy Statement for Nuclear Power Generation (EN-6) 17

implement that solution if the current framework, as set out in the MRWS White Paper, ultimately proves to be unsuccessful in the UK
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B.3.6 As further evidence of its commitment to the implementation of geological disposal, the Government has reviewed and strengthened the arrangements, to provide oversight of geological disposal implementation and hold the NDA to account as the implementation body responsible for delivery.

B.3.7 As stated above, the Government is committed to making the voluntarist and partnership approach to site selection work through the MRWS process. To deliver geological disposal it is necessary to have effective programme management, leadership from Government, clear responsibilities and accountabilities and a timeline and milestones against which progress can be measured. However, this must be reconciled with an approach based on voluntarism. To improve visibility of progress on the MRWS programme, the Government is developing a clear timeline for the implementation of geological disposal, while maintaining its commitment to voluntarism, and will provide annual reports to Parliament on the progress of the MRWS programme.

B.4 Interim Storage

B.4.1 Geological disposal will be preceded by safe and secure interim storage. The first higher activity waste from a new nuclear power station is expected to arise shortly after the power station starts generating electricity, which is currently anticipated to be around 2018. All higher activity waste will have to be stored until a geological disposal facility can accept the waste.

B.4.2 The time that will be required for the safe and secure on-site interim storage of spent fuel and intermediate level waste is contingent on a number of factors, in particular: the operational lifetime of the power station; the availability of disposal facilities; and the location of interim storage facilities.

B.4.3 On the assumption that spent fuel will be stored on-site until it can be disposed of, the key factors in determining the duration of on-site storage are the availability of a GDF and the time required for the spent fuel to cool sufficiently for disposal in a GDF. The NDA's current indicative timetable anticipates a GDF being available to take spent fuel from new nuclear power stations from around 2130, although the future optimisation of plans for the implementation of geological disposal and the expected inventory for disposal indications may provide potential to bring forward this date. Optimisation work will also explore options for reducing the cooling time required for spent fuel prior to disposal. The Government will expect

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operators to ensure their waste is disposable when a GDF is anticipated to be available to take the waste.

B.4.4 The Government recognises that interim storage on-site might be required beyond 2130, particularly in the event that a GDF is not available to take the waste. However, there are some factors which might cause this interim storage period to be significantly shorter, for example it is not necessarily the case that the whole interim storage period for the spent fuel produced by a new nuclear power station will be on-site. The Government does not wish to preclude alternative arrangements, for example a central storage facility, if a site can be identified and the necessary regulatory and planning permissions obtained.

B.4.5 Based on domestic and international experience, the Government is satisfied that interim storage facilities are and will be safe and effective, and will remain so for as long as is necessary. For example, the building of new stores and periodic refurbishment of stores if needed, until a geological disposal facility is available. In the event that

geological disposal facilities are not available to accept radioactive waste in accordance with the indicative timetable set out above, the Government is satisfied that interim storage will provide an extendable, safe and secure means of containing waste for as long as it takes to site and construct a GDF.

B.4.6 The Government is committed to ongoing research and development to support optimised delivery of the geological disposal programme, and the safe and secure storage of radioactive waste in the interim. The NDA and other organisations are currently carrying out research and development on waste treatment, packaging, storage and geological disposal.

B.5 Conclusions

B.5.1 Having considered this issue, the Government is satisfied that effective arrangements will exist to manage and dispose of the waste that will be produced from new nuclear power stations. As a result, the IPC should not consider this question. However there may be planning issues relating to the on-site management of radioactive waste which it is appropriate for the IPC to consider as part of the development consent application (see Section 2.11 of this NPS).

B.5.2 As set out in Part 1, this NPS has been subject to an Appraisal of Sustainability. The Appraisal of Sustainability has examined the impacts on sustainability if radioactive waste from new nuclear power stations is managed in line with the policies and processes considered by the Government in reaching its conclusion on this issue. The Government has taken into account the potential impacts identified in the Appraisal of Sustainability in making its assessment and has concluded that none of the potential sustainability impacts identified in the Appraisal of Sustainability prevent it from reaching its conclusion.

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B.5.3 In line with commitments to review this NPS the Government will keep the arrangements for radioactive waste management and disposal under review and will consider whether any new significant evidence or material that comes forward in the future provides ground for revisiting its conclusion.